

DOCUMENT RESUME

ED 281 017

CE 046 867

AUTHOR Rosenfeld, Stuart A., Ed.
TITLE Technology, the Economy, and Vocational Education.
INSTITUTION Carnegie Forum on Education and the Economy,
Washington, DC.
PUB DATE Nov 86
NOTE 114p.
AVAILABLE FROM Southern Growth Policies Board, P.O. Box 12293,
Research Triangle Park, NC 27709 (\$10.00).
PUB TYPE Collected Works - General (020) -- Viewpoints (120)
-- Information Analyses (070)
EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS Access to Education; Agricultural Education;
Conference Proceedings; Delivery Systems; *Economic
Change; *Educational Change; Equal Education; High
Schools; Job Skills; Minority Groups; Secondary
Education; *Teacher Education; Teacher Supply and
Demand; *Technological Advancement; *Vocational
Education; *Vocational Education Teachers

ABSTRACT

Papers, panels, and commentaries (responses) are provided from a conference attended by traditional educators, vocational educators, and economists to discuss the impact of technology on vocational education in the high school and suggest appropriate responses. The introduction is by Stuart Rosenfeld. The first three papers address the theme of the impacts of technology on the economy: "Changes and Choices: A Review of Technology's Impact on Vocational Education in the High School" (Stuart Rosenfeld), "New Skills for the Changing Economy" (Ray Marshall), and "The New Economy: Hope versus Realities" (Stephen Roach). The next two papers focus on new conceptions of vocational education. They are "Facing an International Economy: The Need for Structural Change in Education" (Marc Tucker) and "A View from Industry: Challenges for Worker Training" (Harry LeColst). Two commentaries are by Jay Robinson and Addison Hobbs. The next three presentations on the nature of the vocational education system itself are "Rethinking the Delivery of Vocational Educational Programs in Secondary Schools" (E. Gareth Hoachlander), "Equity and Vocational Education" (Carol Gibson), and "Linking Theory and Practice: Innovation in the Structure of Secondary Education" (David Mandel). J. Barry Ballard and Ann Bardwell provide commentaries. Two papers focus on the vocational education teaching profession, supply and demand, and preparation. They are "The Education of High School Vocational Educators" (Willis Hawley) and "Vocational Agriculture Teacher Preparation" (Jasper Lee). Commentaries by Sara Shelton and Joe Nathan are presented next. Neal Peirce summarizes the proceedings. (YLB)

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Carnegie Forum on Education and the Economy

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TECHNOLOGY, THE ECONOMY, AND VOCATIONAL EDUCATION

Editor
Stuart A. Rosenfeld
Southern Growth Policies Board

November 1986

Southern Growth Policies Board
Research Triangle Park, N. C. 27709
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Executive Director: Jesse L. White, Jr.

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Washington, D.C. 20036
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Primary support for this project was provided by the Carnegie Forum, a program of the Carnegie Corporation of New York, and the American Can Company Foundation. Additional support was contributed by Sears, Roebuck and Company – Atlanta and the Arkansas Vocational - Technical Education Division.

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Library of Congress Catalog Card Number 86-63329

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Preface

The recent resurgence of interest in education reform has an Achilles heel. Characterized by an interest in excellence, the reform movement has all too often been marked by an implicit lack of interest in those students not bound for four year colleges.

Which is why, when Stuart Rosenfeld of the Southern Growth Policies Board called to inquire about the Carnegie Forum's interest in co-sponsoring a meeting on vocational education, we were quick to agree. No education system that turns its back on half of its students can possibly be excellent. No country that tolerates the steady growth of a permanent underclass can possibly succeed. Excellence is the right theme, but only if it applies to all.

We were particularly pleased that the call came from the South. A fresh breeze is blowing from the South these days, a readiness to provide real leadership on education policy, to shape the future. Governor and Hillary Clinton certainly set the stage early in our deliberations, providing a call to action that made it clear that top policy makers were listening, that they were looking for bold ideas, and were willing to act on them. Former Governor Winter, in his role as Chair of the Commission on the Future of the South, made it equally clear that other top policy makers in the South were an eager audience for the report of this conference.

The Carnegie Forum was very pleased to be part of this conference, to contribute what we could to a reconsideration of the role of vocational education in our society, to an effort to once again reconceive education as excellent only when it combines intellectual rigor with the application of intelligence to real problems, when it combines head and hand, and when it embraces all our students.

Which is not to say that the conference produced consensus, but rather that it provided a meeting ground for people with fresh perspectives and enduring commitments to confront a neglected but critically important set of issues in American education.

Marc S. Tucker
Executive Director, and
David R. Mandel
Associate Director
Carnegie Forum on Education and the Economy

Acknowledgements

This publication is the result of a cooperative effort between the Carnegie Forum on Education and the Economy and the Southern Growth Policies Board. A number of people contributed to its completion. David Mandel, Associate Director of the Carnegie Forum was instrumental in helping to conceptualize, design, and organize the materials included. Raymond F. Reisler, Associate Director of the American Can Company Foundation, helped identify participants and offered useful suggestions throughout the process.

Janet Papke, Administrative Assistant for the Southern Growth Policies Board (SGPB), made all conference arrangements and ensured that everything ran like clockwork; Robert Donnan, Media Specialist, took care of all the details associated with publication, including design and layout; Thomas Grey, consultant, copy-edited, proofed and prepared documents for typesetting; and Mary N. Eldridge, my wife, provided invaluable advice and editing assistance throughout.

The conference in Little Rock, Arkansas, could not have taken place without the support of Governor Bill Clinton of Arkansas, Chairman of the Southern Growth Policies Board, and his staff. Governor Clinton, Ms. Hillary Rodham Clinton, former Governor William F. Winter of Mississippi, and Dr. Robert Albright, President of Johnson C. Smith University in Charlotte, North Carolina each served as moderators of and commentators on the sessions.

Stuart A. Rosenfeld
Director of Research and Programs
October 1986

Introduction

Stuart A. Rosenfeld
Director of Research and Programs
Southern Growth Policies Board

Vocational education has been an accepted part of the high school curriculum since the turn of the century. In 1917, with support from industry, the Congress passed the Smith-Hughes Act, providing the first federal funds for public secondary schools. That law legitimated vocational education, set it on its course, and established its place within the public schools.

A strong underlying force for vocational education was technological progress. The changing needs of modern American industry required a larger labor force able to perform tasks that were highly specialized and utilized new mechanical equipment. The industrial environment was geared to the time clock and managed in an authoritarian and hierarchical manner. These work characteristics were at cross purposes with the skills, knowledge, and work habits transmitted through the classic high school curriculum.

The Smith-Hughes Act and the constituency it created among industrialists and vocationalists served to separate both the program and its teachers and administrators from the non-vocational programs and their teachers and administrators. The debate over the proper purpose and structure of vocational education, subdued during recent decades of growth, was resurrected in the 1980s. A major recession came and went but shock waves of new international competition and technological changes continued to reshape the nation's economy.

In response to the economic forces, the public has turned its attention to public high schools and their role in economic development, and technology once again rears its head as an underlying force. This time, however, the skill and knowledge requirements are different from those which best supported an industrial economy. The emerging information economy is better served by employees who are flexible and adaptable than by specialists, by individuals who can solve problems rather than by those who can perform manual functions most efficiently, and by those who are innovative and can work independently rather than those most willing to simply follow directions. Changes in the ways technology has influenced vocational education policy are traced over time in the opening chapter.

In its recommendations for changes in public education, the public virtually ignored vocational education. In "A Nation at Risk" and "Action for Excellence" there were no recommendations for vocational education. In fact the recommendations for greater requirements for basic skills in the high school imply less time for occupationally specific courses. More rigorous studies, such as Ernest Boyer's "High School" and John Goodlad's "A Place Called School," concluded that vocational education has become a white elephant within public schools, and that "in its present form it is not in students' best interest.

These oversights and obvious slights of vocational education prompted renowned vocational educator Marvin Feldman to publish "In the Name of Excellence: The Ambush of Vocational Education." And they led the National Center for Research on Vocational Education to quickly assemble a task force to study vocational education in the high schools, resulting in "The Unfinished Agenda." Although that report was well intended, it was seen as partisan, as representing the views of vocational education advocates, and as a defensive tactic. A careful reading, however, reveals that it does respond to the changing needs of the economy and it includes recommendations which, if implemented, would drastically reshape vocational education.

Why did education experts and policymakers alike pay so little attention to vocational education in their examinations of public high schools and in their recommendations? Has the program gone out of fashion, aimed at a labor market that has passed us by? Or has it gone out of

favor because it has failed to produce sufficiently "well educated graduates? Are there ways to restructure the enterprise so that it better meets the needs of a changing economy and society and still meets the needs of those students who perform better in the applied setting that vocational education provides?

In March 1986, the Southern Growth Policies Board assembled some of the nation's top educators and economists to discuss the impact of technology on vocational education in the high school and suggest appropriate responses. The conference, entitled "Technology, the Economy, and Vocational Education," brought together traditional educators and vocational educators to rethink the role of vocational education in light of the educational reforms, the changing workplace, and the new federal legislation.

Papers were prepared primarily by experts outside of conventional vocational education circles in order to introduce ideas unhampered by tradition, loyalties, and convention. Vocational educators, as well as representative local and state education officials, were invited to respond to the presentations.

The panels were organized around four themes: the impacts of technology on the economy; the effects of those changes on the skills and knowledge required of employees; ways to finance, deliver, and evaluate new programs; and what kind of teachers will be needed for a more appropriate form of vocational education.

After introductory remarks by the Honorable Bill Clinton, governor of Arkansas and chairman of the Southern Growth Policies Board, Ray Marshall—professor at the LBJ School of Public Policy of the University of Texas and former Secretary of Labor—and Stephen Roach—vice-president and senior economist of Morgan Stanley—described changes they anticipate in the South's economy.

Dr. Marshall emphasizes the shift to an internationalized information economy but, he warns, the importance of manufacturing should not be underestimated. The South's economy cannot sustain growth without a strong manufacturing base. The key to international competitiveness and to the survival of manufacturing, he suggests, is technological innovation. Dr. Marshall calls for a "burst of creative pragmatism like we had immediately after World War II" to re-energize the region. A basic condition is an educated people, and a "world class vocational-technical system that pays more attention to academic subjects."

Stephen Roach backs up the shifts in the economy with data, revealing the rates of change and the extent to which information-related businesses and jobs are dominating the economy and labor markets. Data showing lagging productivity growth of information workers pinpoint potential problems for the economy. That is because, he suggests, the nation has focused resources on improvements in hardware rather than in software and managerial techniques. "The interaction between people and hardware is sorely missing in today's technological revolution," he argues.

The subject of the next two chapters is "new conceptions of vocational education." Building on the economic foundation laid by Marshall and Roach, Marc S. Tucker, executive director of the Carnegie Forum on Education and the Economy (co-sponsors of the conference) and Harry W. LeColst, vice-president of LTV Aerospace Industries, suggest new ways of thinking about vocational education in the high school. Tucker deflates the theory that work is being deskilled by technology and builds a case for an economy that will require a "more educated and more creative work force. In his opinion, students will be best prepared by a more rigorous and demanding vocational education curriculum -- one which would look more like an academic curriculum and would blur existing differences between the two curricula as much as possible.

Harry LeColst discusses the problems associated with obtaining a technically trained work force in rural areas. As an employer, his stated preference is for workers trained not in narrow fields, but who pick up new skills easily and have a broad-based knowledge of "technology."

The third set of chapters is on the nature of the vocational education system itself. E. Gareth Hoachlander looks at what courses those students classified as vocational education students actually take. Using longitudinal data from "High School and Beyond," he finds that half

of the occupational courses are not occupational specific and that in the good programs these courses do in fact impart basic skills. Further, he finds that most vocational education students do not spend enough time in the occupationally specific curriculum to expect much impact. The challenge, he concludes, is not to eliminate vocational education but to avoid aimless enrollment in unrelated vocational education courses and find out what programs work best and determine how to reproduce those types programs.

In contrast, David R. Mandel reflects on the recent reports of the National Academy of Sciences and the Committee on Economic Development, which imply that the high school is no place for vocational education. Even as an alternative pedagogical method, Mandel states, vocational education is no longer relevant in light of today's economy. Instead, he recommends that high school education provide more opportunities to link theory to practice and real problems. Students desiring more in-depth occupational training ought to be able to transfer to community colleges or technical institutes at an earlier stage of secondary education.

In the last part of this section, Carol Gibson discusses the importance of vocational education to minority youth and the accessibility of high quality programs. Vocational education, in practice, does not offer women and minorities the same opportunities open to white males. Ms. Gibson describes some exemplary large-city programs that have been able to overcome racial and sex bias and expand opportunities. They are highly dependent, however, on earmarked funds, strong local leadership, and a desire for equity.

The last section is on the vocational education teaching profession, on supply and demand, and on the preparation those teachers ought to have. Willis D. Hawley, dean of the Peabody School of Education at Vanderbilt University and Jasper S. Lee, head of the Department of Agriculture and Extension Education at Mississippi State University, each prepared papers.

Dr. Hawley's recommendations for teacher preparation are not greatly different from the preparation required for non-vocational programs. His framework is based on a more academically rigorous vocational education that will be less specialized, more technically sophisticated, and less separate from the academic curriculum. Therefore, a grounding in the humanities and sciences and expertise in teaching methods are as important as knowledge of the workplace. In all, Dr. Hawley lists nine proposals for the improvement of vocational education that range from knowledge of educational technologies to more selective admissions and performance-based screening for prospective teachers.

The concluding paper examines the preparation of vocational agriculture teachers as a possible model for vocational education. Preparation for teaching agriculture historically has been more rigorous than in other vocational education fields, with higher requirements for teaching basic skills, particularly math and science. Lee argues that vocational agriculture is responsive to the increasing demands of technological change.

Finally, syndicated columnist Neal Peirce wraps the set of papers up with his summary of the proceedings, impressed by the evidence that new and better preparation will be needed for work in the future, concerned about the tracking that exists within high school curricula, and agreeing that vocational education will have to re-evaluate the basic premises upon which it was founded.

THE CONTEXT:
TECHNOLOGY, TRADE, AND SKILL

Changes And Choices: A Review of Technology's Impact On Vocational Education in the High School

Stuart A. Rosenfeld
Director of Research and Programs
Southern Growth Policies Board

The farmer who comes to have an expert knowledge as to soils, who understands the rotation of crops, the breeding of stock, the testing of seeds, the chemical properties and the value of fertilizers... will not only find agriculture a paying business...but a keen pleasure.

In support of federal aid to vocational education
Congressional Record-House, July 7, 1916, p.11466

[Achieving industrial supremacy] can only be done through the scientific organization of industry; that scientific organization of industry can only come through the training of the workers.

In support of federal aid to vocational education
Congressional Record-Senate, January 2, 1917, p.776

As technology changes the world of work, it inevitably affects the relationship between man and his work....It is an open question whether present forms of vocational and technical education are equal to the demands...

Man, Education and Work
Report of the American Council on Education, 1963

Introduction

One of the most difficult challenges that vocational education faces is keeping up with technological change. It seems as if the enterprise is chasing a moving target, continually struggling to readjust programs, replace equipment, and modernize facilities. But technology always manages to stay just a step ahead. To its credit, vocational education has accepted the challenge and has used all its policy resourcefulness to stay abreast of new technologies and to adapt to change. Vocational education's current policymakers respond by encouraging programs for new occupations created by new technologies and by exhorting schools to update the curricula and equipment in their existing programs to match technological advances in the workplace.¹ In other words, vocational education prepares youth to adapt to and use technology on the job.

However, there also are other ways of viewing technological change and other possible responses. At any period in history, there have been competing ideas about how vocational education ought to prepare for and react to the impact of technology. For example, under certain sets of circumstances, policies have been formulated and implemented that educated youth to understand and apply technology, as well as to work with it.

A review of some of the key federal legislation that has shaped vocational education and established its goals illustrates the range of ways in which technology can influence vocational education policies. Four important junctures in vocational education history demonstrate the impact of technology on schools and how vocational education has responded: the Morrill Land Grant Act of 1862, the Smith-Hughes Act of 1917, the Vocational Education Act of 1963, and the

Carl D. Perkins Vocational Education Act of 1984. These historical accounts demonstrate that the aims of vocational education have been broader than just preparing workers to adapt to technology in the workplace. Understanding the conditions and assumptions under which policy decisions have been made might provide new insights for more effective vocational education in the future.

The Morrill Land Grant Act of 1862: A Practical Education for Scientists and Mechanics

It may seem odd to include the Morrill Act of 1862, which created a large number of state land-grant colleges, as vocational education policy. But it is important to bear in mind that in the mid-nineteenth century the high school was quite rare; youth who wanted to extend their education beyond the grammar school went directly to college, whether it was at age 15 or age 20. Even as late as 1915, land-grant schools in 24 states, including Mississippi, North Carolina, South Carolina, and Virginia, offered high school programs in vocational agriculture.²

At the time of the Morrill Act industry was basically a small-scale craft operation that gradually was becoming larger, more specialized, and more technologically advanced. Agriculture was a family operation that was becoming more scientific and mechanized. Most of the population was engaged in agriculture, which was then the backbone of the nation's economy. From the time he entered the Congress in 1856, Senator Justin Morrill of Vermont had been seeking federal support for agricultural education in order to make practical and scientific education available to farmers so that they would be able to take advantage of scientific advances in agriculture. In a memo, he wrote that poor farming methods were leading to "a rapid deterioration of the soil, which would not be likely arrested except by a thorough and scientific knowledge of agriculture and by high education of those who are devoted to its pursuits."³ And despite his agrarian interests, Senator Morrill "could not overlook mechanics in any measure intended to aid industrial classes in the procurement of an education that might exalt their usefulness."⁴ In 1862 he was finally successful in getting the Congress to pass the Land-Grant Act.

The aim of the new land-grant colleges that were established on the 30,000 acres of public land apportioned to each state was to develop and offer instruction in the natural sciences and technical courses suited to the needs of farmers and mechanics. Morrill thought that by establishing colleges for practical and scientific education, he would make college accessible to everyone and break what he saw as the "monopoly of education" for the so-called professions. The legislation represents the first national policy enacted specifically for education -- "to promote the liberal and practical education of the industrial classes in the several pursuits of life."

The Smith-Hughes Act of 1917: Mass Production and Scientific Farming

By the turn of the century, the structure of the economy and the structure of public education had both changed significantly. First, scientific advances and new technologies had led to larger-scale mass production, which replaced much of the smaller-scale, craft production. Further, the science of management had changed the organization of work; it was more specialized and hierarchical, with more decisions in the hands of professional managers. Production and management technologies had altered the skill and attitudinal demands of work. Thus, the demand for skilled artisans was growing more slowly than the demand for semi-skilled operatives and professionals. It was less important for workers in this new environment to understand scientific concepts than to manipulate the most technologically advanced equipment.

Second, education had become compulsory in most states, and high schools were more common; yet in 1900, only four percent of high-school-age youth attended high school. To prepare youth for the technology of standardized manufacturing, and to expand and extend public education to serve a larger proportion of the population, educators created a new curriculum to prepare youth for immediate employment. They called it vocational education.

Although support for vocationalism was quite widespread, perceptions of how technology ought to influence the vocational education curriculum and what could be expected of those educated varied considerably. Different positions were held by progressive educators, who believed youth should understand technology; traditional educators and industry, who wanted youth to conform to the demands of technology; labor, which was interested in increasing workers' opportunities to manage technology; and agricultural and rural leaders, who wanted their constituents to be able to apply technology.

Trade and Industrial Programs: Adapting To Technology

Progressive educators, led by John Dewey, argued for a kind of industrial vocationalism that would prepare youth to understand and make optimum use of technology.

Industry has ceased to be essentially an empirical, rule-of-thumb procedure, handed down by custom. Its technique is now technological: that is to say, based on machinery resulting from discoveries in mathematics, physics, chemistry, bacteriology, etc....As a consequence, industrial occupations have infinitely greater intellectual content and infinitely larger cultural possibilities than they used to possess. The demand for such education as will acquaint workers with the scientific and social bases and bearings of their pursuits becomes imperative, since those who are without it inevitably sink to the role of appendages to the machines they operate.⁵

The private sector, whose views were represented by the National Society for the Promotion of Industrial Education (NSPIE) and the National Association of Manufacturers (NAM), wanted a form of vocational education that would improve industrial efficiency and improve the competitive position of American products vis-a-vis Germany. This was essentially a human capital argument. Even within the private sector, however, there was a range of opinions concerning how much mastery of technology was necessary or desirable. The president of American Telegraph and Telephone argued that considerable knowledge is required. Addressing the NSPIE on the topic of vocational education in 1907, he said:

It is generally recognized that the changes in industrial conditions that have been brought about during the last few years have been almost revolutionary....The man at the bench, the man at the machine, the man at the tool, should understand his work so well that he is on the lookout for all improvements that are possible. If he knows the law of the machine, if he understands the theory of its operation and the qualities and characteristics of the material out of which it is made, and of the material upon which he is working, he will be in a position to exercise thought and imagination in the direction of improvements.⁶

Other industrialists, however, in particular the smaller businesses represented by the NAM, believed that not all youth were capable or even needed technical mastery. They wanted first and foremost to ensure an adequate supply of employees with good work habits who would remain satisfied with production work. David Snedden, spokesperson for traditional educators, criticized the technical high schools that predated the Smith-Hughes Act for reversing their priorities and including more technical education than was required for most manual labor.⁷

Organized labor, although suspicious at first of a form of education that established separate curricula for some youth, also supported vocational education policy but expected it to

increase the occupational mobility of working class youth. Samuel Gompers, president of the American Federation of Labor (AFL), expected that vocational education would prepare those who completed the programs to be "capable of acting as foremen, superintendents, or managers -- men possessing the comprehensive insight, interest, and skill necessary for the organization and direction of a department or shop."⁸ This required a strong grounding in science and technology, and Gompers argued that vocational education ought to include mathematics, physics, chemistry, mechanics, and a sound understanding of economics.

Vocational Agriculture: Adopting Technology

Technology had just as great an impact on rural areas as it did on cities experiencing industrialization but with very different implications for vocational education. Consequently rural programs responded to technology differently than urban programs did. Farming, still decentralized and family owned and operated, required business, organizational, and technical skills that were more similar to those needed in craft and cottage industries than those of large-scale production. Unlike manufacturing industries, where experts made decisions regarding the use of technology and the vocationally trained workers had to conform, farmers had to be educated to make investment and resource allocation decisions themselves. Farmers had to solve their own problems, testing feeds, analyzing soils, or choosing new equipment. Therefore, the education required to be a successful farmer was quite different and the work habits were quite different.

In contrast to the dissention among policymakers about the form industrial education ought to take, there was virtual consensus among supporters of vocational agriculture. They agreed upon the need for expanded programs and better resources in the high schools and on the importance of science, technology, and problem-solving in the curriculum. The size and isolation of rural high schools, as well as the academic foundations of existing agriculture education, kept vocational programs closely integrated with the academic curricula. And the existing network of agricultural organizations disseminating information about scientific advances in agriculture ensured a strong emphasis on science in the vocational curriculum. The Smith-Hughes Act of 1917 simply legitimated and increased resources for what already was in operation in many states. In 1916, for example, 83 high schools in Wisconsin already had programs that met the state's requirements for state aid to vocational agriculture by including units in botany, physics, and chemistry in the vocational curriculum.

The debates in the Congress provide a sharp contrast between the goals and expectations of national leaders for vocational agriculture and those for industrial and trade programs.

Science has touched farm life as with a magic wand, and it has blossomed beneath its potent touch....In the sunny Southland where one-third of a bale of cotton has with difficulty been obtained from an acre of land, it has been demonstrated that three bales can be added to the nation's wealth....This and more science can do for agriculture.⁹

Scientific farming was acknowledged as the key to increased productivity. Federal policies were already supporting research, experimentation, and demonstration methods in agriculture. Vocational agriculture was viewed as a natural extension of technical education for adults, a way of providing similar knowledge and information to young prospective farmers. "The boys' and girls' clubs have shown what a combination of scientific knowledge with youthful enthusiasm can accomplish. It is to spread abroad this knowledge, and to vivify and fuse it with the energy and ambition of all rural young America that vocational training in agriculture is intended."¹⁰

One Bill, Two Systems of Vocational Education

In 1917, after a full decade of debate in the Congress, the Smith-Hughes Act was passed, and \$7.2 million per year was appropriated in perpetuity, with half going to vocational agriculture to be allocated to the states based on their rural populations and half to trade and industrial programs based on their urban populations. (At least 20 percent of the latter had to be spent on home economics.) The bill established vocational education once and for all as a national priority and preparation of youth for immediate employment as its *raison d'être*. But, just as important, it legitimated and firmly rooted vocational education as a separate and distinctive curriculum.

Differences in the politics and economies of urban and rural areas and in how technology affected work in each, however, led to a dual vocational system. The Trade and Industrial programs (T&I) reflected the views of the more traditional educators and the needs of some parts of the business community. The response of T&I programs to technology was reactive, to prepare youth to adapt to changes brought about in large part by technology, and they were intended to achieve technical efficiency in an increasingly specialized industrial economy. Vocational agriculture reflected the desires of rural people for a more practical rural education and more knowledge about modern agricultural methods. (Their ideas about education embodied many of the educational concepts of the progressive educators.) The response to technology was proactive, preparing youth to understand and apply science and technology. The difference, in a nutshell, was between vocational education to prepare youth to use technology and vocational education to prepare youth to be able to choose technology.

The Vocational Education Act of 1963: Help Wanted: Technicians and Specialists

Despite periodic infusions of additional federal funds and the expansion of occupational program areas and increasing concerns about technology and technological unemployment, vocational education changed little structurally and programmatically between 1917 and mid-century. As the second half of the century unfolded, however, new forecasts of extensive industrial automation led policymakers to rethink vocational education. A series of federally sponsored studies in the mid-fifties warned that "The very fact that electronics and atomics are unfolding simultaneously is a portent of amazing changes ahead....Along with automation and the introduction of labor-saving machinery, whole new industries have arisen and may be expected to arise." A congressional subcommittee reported that the most worrisome aspect was "the near-unanimous conclusion of the witnesses that the nation is faced with a threatened shortage of scientists, technicians, and skilled labor."¹¹

It took the launch of the Sputnik satellite, though, to create the crisis atmosphere necessary for legislative action. The Congress quickly responded by passing the National Defense Education Act of 1957 (NDEA). Title VIII of NDEA amended the existing vocational education legislation (George-Barden Act of 1946) to alleviate shortages of such technicians, authorizing funds for the training of technicians for occupations requiring scientific knowledge. Title VIII also authorized funds for specialized technical institutes and area vocational centers to deliver the more specialized vocational education.

That legislation, however, was directed primarily at the college-bound student and reached only a small number of vocational education students affected by technological change. Many believed that the entire vocational education enterprise needed to be reviewed, which led President Kennedy to tell the Congress in 1961:

The basic purpose of our vocational effort is sound and sufficiently broad to provide a basis for meeting future needs. However, the technological changes which have

occurred in all occupations call for a review and a re-evaluation of these [Vocational Education] Acts, with a view toward their modernization.

The President requested the Secretary of Health, Education, and Welfare to convene an advisory body, called the "Panel of Consultants on Vocational Education," to evaluate and recommend changes for vocational education in light of changing technology and its impact on employment. The new vocational legislation that resulted from the Panel of Consultants' recommendations did indeed revise national priorities. The most significant changes were that programs were to be judged and funded not on the basis of individual occupational preference, as indicated by enrollment, but on how well they met labor market demand. Furthermore, special services were to be provided for those "who have academic, socioeconomic, or other handicaps that prevent them from succeeding in other vocational education programs."

The response of policymakers to technological change was to provide vocational education for new occupations based on technology, including a new cluster called "Technical Occupations." These new programs prepared youth for employment in occupations that often required them to understand technology, as well as to operate technical equipment or to support scientific work. The Panel found that:

Because of advancing technology, many jobs require more technical proficiency and greater knowledge of mathematics and science. These jobs also often require more mature persons than youth of high school age. As a result, attention is increasingly focused on postsecondary vocational and technical education.¹²

Since skills and knowledge required for many of the technical occupations could not be acquired in four years of high school, more and more two-year technical institutes became eligible for, and received, federal funds. The most logical response would have been for the high schools to coordinate their programs with those in two-year institutions to make sure that their vocational education programs offered the basic skills and other prerequisites for the one- and two-year programs as well as prepared youth for immediate employment. Instead, the high schools and postsecondary schools often competed for limited resources. High school programs became even more specialized, attempting to prepare students for technical occupations, and colleges placed too much emphasis on office occupations, trade, and industrial programs which high schools offered effectively and too little on technical programs.

The Carl D. Perkins Vocational Education Act of 1984: Acknowledging the Impact of Technology

By the early eighties, federal vocational education policy had accomplished some of what the 1963 legislation and subsequent amendments in 1968 and 1976 had intended. Vocational services for disadvantaged and handicapped populations and for women had improved markedly, due in large part to the federal funds earmarked for their use. Enrollments in postsecondary and adult programs had grown by leaps and bounds, particularly in the technical occupations. In 1963, 11 percent of all vocational education students were in postsecondary programs. By 1981, 38 percent of all vocational education students and 50 percent of those in occupationally specific programs were in postsecondary institutions. Of the latter, 13 percent were in programs within "technical occupations."

Still, there was a nagging concern among policymakers that vocational education was not keeping pace with technological change. New advances in information technology affected large numbers of white collar occupations previously relatively immune. Yet a survey conducted by the University of California for the National Institute of Education found few instances of high

schools altering their programs based on new occupational projections or skill needs. Despite prodding with federal funds, educational institutions respond slowly to change and have not been able to adjust quickly enough to meet the needs of technology. Recommendations of a 1982 National Governors' Association (NGA) Task Force on Technological Innovation included "increasing training of technical personnel." The group stated that "Our educational system must give new emphasis to training technical personnel, ensure that graduates have appropriate training for available jobs, and maximize our human potential for technological innovation."

In 1984 a new bill, the Carl D. Perkins Act,¹³ was enacted that, for the first time, explicitly addressed and responded to the impacts of technological change. Technology was no longer treated as an unseen force acting on labor market demand, but as a force with known dimensions that should be factored into vocational education instructional policies. From the opening declaration of purpose to the concluding sections mandating national studies, the word "technology" appears repeatedly. The Act directs states to plan for technological changes in the economy, to cooperate and coordinate programs with new industries dependent on a technically competent workforce, to educate and train for technological change in the workplace, to use technologically advanced equipment, and to assess their performance in meeting technological needs.

The language is backed with dollars -- at least thus far, before Gramm-Rudman- Hollings takes effect. In fact, for the first time, federal funds cannot be used to operate existing programs but must be used for improvements or expansions, many of which are technology-driven. The legislation also assumes that educating for technology requires stronger basic skills and includes as one of its nine stated purposes to "improve the academic foundations of vocational students and to aid in the application of newer technologies (including the use of computers) in terms of employment or occupational goals."

State plans, required before a state can receive federal funds, include a requirement that programs be assessed in terms of five criteria, which include:

- (a) the pertinence of programs to the workplace and to new and emerging industries and
- (b) the technological and educational quality of vocational curricula, equipment, and instructional materials to enable vocational students and instructors to meet the challenges of increased technological demands of the workplace. (Section 113 (a)(3))

The 24 authorized uses of the basic grant include:

- (a) the improvement of vocational education programs...including high-technology programs involving an industry-education partnership...;
- (b) exemplary and innovative programs which stress new and emerging technologies...;
- (c) the acquisition of high-technology equipment for vocational education programs; and
- (d) the acquisition and operation of communications and telecommunications equipment for vocational education programs. (Section 251(a))

Federally funded counseling is supposed to help individuals "develop new skills to move away from declining occupational fields and enter new and emerging fields in high technology areas...." Even the part authorizing funds for consumer and homemaking education includes the aim of "understanding the impact of new technology on life and work."

The addition to the legislation that provides for adult training and retraining is predicated on the impact of technological change, and it authorizes grants to "employers who require assistance in training individuals for new employment opportunities or in retraining employees in new skills required by changes in technology, products, or processes." (Part C, Section 321)

The Congress set up a separate authorization in order to make sure that states pay attention to those technology-related occupations that are expected to be in short supply, to provide incentives to businesses to cooperate, and to ensure equal access to those jobs that are assumed to be high paying. Part E of the Act is entitled "Industry-Education Partnership for Training in High Technology Occupations."

The new vocational education legislation, as is true of all legislation, is a compromise between the positions of the two houses of Congress. Technology, however, was one issue on

which there was little disagreement. The resulting bill includes numerous incentives for programs to respond to technology. But, based on the language of the Act, the underlying beliefs that drive the bill are not especially new. With the exception of the Statement of Purpose, which notes the importance of academic foundations needed for technology, most of the provisions are aimed at responding to technological change by modernizing equipment, updating curricula, and encouraging enrollments in programs for emerging, high-growth, high-tech occupations. The focus on equipment, in particular, ignores the lessons of history. As far back as 1963, the American Council on Education warned that "The school that invests heavily in shop and lab equipment in an attempt to duplicate industrial conditions soon learns that it cannot afford the constant replacement that it finds necessary."¹⁴ Nevertheless, that is a primary focus of current policy, especially given the constraints of the legislation on using funds only to improve programs, and there is little to encourage programs that teach students to understand technology or be able to apply scientific knowledge, in the way that vocational agriculture has, or in ways that many critics of contemporary vocational education suggest.

Vocational Education in the Year 2000 Options for Future Policy Consideration

In the past, three distinct views of how vocational education best responds to technology have guided vocational education policy. The first view is that technology influences the skills and work habits needed in the workplace and that all workers ought to be technology-familiar. Even if high-technology jobs constitute only a small share of all jobs as some forecasters predict, all workers ought to be able to adapt to technology-driven changes and use the tools of new technologies with a minimum of retraining and all ought to be comfortable with sophisticated equipment, even in what are basically non-technical jobs. The level of technical expertise, however, may not be very high.¹⁵ Vocational education policies based on this view focus on supplying the latest equipment, such as computers and word processors for office occupations, and on the kind of discipline needed in the new work environment.

A second view is that technology influences occupational demand and that a significant proportion of the labor force has to be technology-skilled so it can meet the growing needs for technicians and support for professional technical staff. This view is predicated on forecasts of growing demand for a technically trained workforce, ranging from the more conservative forecasts of Wassily Leontief and Faye Duchin and the Bureau of Labor Statistics to the more radical changes forecast by Marvin Cetron. To meet the vocational needs characterized by this view, students need to learn how to manipulate technical equipment and perform technical tasks, become familiar with measuring instruments, learn basic statistics, and be able to observe and record changes clearly and accurately and make judgments concerning inputs to and outputs of processes. Since these skills and knowledge require more education and maturity, the most efficient high school vocational education may be preparatory rather than terminal. This view is exemplified by the various technical occupations that are encouraged in federal policy, and have been since the National Defense Education Act of 1957.

A third view is that technology influences the organization of work. According to a recent study from the Office of Technology Assessment, "methods of organizing work are changing in many cases to fully exploit new technologies," which, it states, includes the social system of the business as well as the production system.¹⁶ The end result is that workers ought to be technology-wise, acquiring enough knowledge of the basic concepts of technology and enough self-confidence and judgment to make decisions to adopt new technologies, to allocate resources (including the use of their time), to contribute to new applications of technology, to make on-line decisions in a technical production process. This view is based not just on extrapolating trends, but on visions of ways that can make more effective use of the increasing skills and knowledge of the work force. The 1982 NGA Task Force on Technological Innovation represented this vision when it recommended "allowing workers a stake in technological innovation."¹⁷ Support for this view makes demands on employers as well as on employees – for a work situation where employees are given sufficient information and discretion to use their knowledge and judgment.¹⁹ An example of what vocational education has been able to accomplish in this kind of a setting is vocational agriculture, which educates youth to make investment decisions for equipment and to experiment with feeds, seeds, and fertilizers and encourages continuing education for adult farmers.

Each of the three views has been based on a particular set of assumptions about the innate capability of the individual, the impact of technology on work and the workplace, and social relations within the firm. What policymakers believe, for example, about how technology will change skills requirements or create new industries with as yet unknown occupations, and whether one believes that the effects of technology will lead to a more hierarchical or more participatory management style, with decisions in the hands of fewer or more people, should indeed influence future decisions at the local, state, and federal levels. Understanding how

political beliefs and economic events have shaped vocational education in the past can help make choices in the future about the ways that vocational education can be most responsive to and supportive of technological change.

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New Skills for the Changing Economy

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Introduction

One of the wisest and most influential teachers I ever had used to say to me: "The trouble with you, Ray, is you don't understand all you know." At the time I thought this was merely a play on words. I now realize that it is a fundamental problem with a lot of us, individually and collectively. In fact, that expression probably explains where much of the country is on human resource development -- we know, and say almost reflexively, that our people are our most important asset, but corporate and public policies usually give relatively low priority to education and training.

Because we know that education and training are important, corporations and governments (especially state and local governments) spend a lot of money on these learning functions -- about \$453 billion, according to one estimate, \$210 billion of which was by private industry for formal and informal employee training. (Carnevale, 1986) But until recently we really have not given much attention to how that money was spent, and we have allowed the education establishment to run itself in ways that suggest we really have not been as concerned as we should be about the development of our people. Perhaps it is because we don't understand all we know. As the organizers of this conference recognize, it is very important for us to understand the linkages between the economy, technology, and vocational education.

There is no question at all about the importance of human resource development to economic performance in the past. Detailed and sophisticated studies by economists have consistently found that knowledge, technology, and improvements in the quality of our human resources have been responsible for an overwhelming share of our improvements in productivity and most of our growth in national income. There is, however, some question about whether or not human resources will be as important in the future as in the past. According to one scenario, technology will deskill jobs and most jobs of the future will require less education and training. Others argue that it will require more education, especially technical education.

This paper will outline what seems to me to be the most important aspects of our current economic environment, especially developments involving internationalization and technological revolution. Many of our institutions, including our national and international policy processes and our education system, have been rendered obsolete by those developments. The consequences for the United States have been a loss of industrial competitiveness, declining productivity and declining real wages, and a loss of American political and economic influence in the global economy. A reversal of these trends requires considerable policy and institutional reform. My main purpose is to explore the role of education in general and vocational-technical education in particular in these institutional reforms.

The Internationalized Information Economy

Some people characterize the emerging economic systems in the industrialized countries as "post-industrial." However, this term is not very appropriate because it implies that industry -- meaning manufacturing -- is no longer important. This is a serious misreading of reality. Just because agricultural employment has become a relatively small part of total employment, we do not speak of the "post-agricultural" society. In a highly interdependent society the linkages between

industries are such that the employment or value-added generated by a particular industry category is not descriptive of the importance or even the real nature of that sector. Even though agriculture itself accounts for only about 3 percent of employment, the food industry accounts for 30 to 40 percent. In some sense we have not reduced the importance of this sector -- we have redistributed the functions so that some activities previously performed in the home are now performed in the market and new service and manufacturing activities combine with agriculture to focus on the food industry. Similarly, some economists imply that the decline of manufacturing is of no concern because we will shift to services -- or the "post-industrial" society. This view underestimates the continuing importance of manufacturing to the entire economy and especially the high value-added services and technological innovation. We are not likely to have a strong economy without a strong manufacturing sector.

It therefore seems more appropriate to characterize the emerging economy as an internationalized information era. This is so because universal imperatives of our time are internationalization of markets and the pervasiveness and impact of information technologies. Internationalization subjects domestic management and industrial relations systems to the requirements of international competition. For high-wage countries that wish to maintain or improve their real wages, this means heavy emphasis on technological innovation. The loss of technological advantage forces competition to be mainly on the basis of prices and wages, which probably implies declining real wages and incomes for a high-wage country like the United States.

Loss of Industrial Competitiveness

A major problem for the United States in an internationalized information world is the loss of competitiveness of much of our industry -- traditional as well as high tech. There is no question that we have lost competitiveness, but there is considerable question about the implications and causes. The best measures of our competitiveness problem are the loss of market share (absolute and across industries) and declining profitability of enterprises and real wages for American workers. These losses, in turn, have resulted in declining family incomes (workers in export and import industries are much more highly paid than those not directly engaged in the trade sectors), growing trade deficits, and rising external debt -- which implies low standards of living in the future.

Some economists believe our loss in competitiveness was inevitable because the dominant position occupied by the U.S. in the world economy after World War II could not be sustained. Many economists also see no cause for alarm about declining manufacturing employment -- arguing that it is natural for a wealthy economy to shift from manufacturing into services. Some also believe most of our problems are due to misguided national economic policy -- especially our huge budget deficit, the consequent higher interest rates, and the overvalued dollar. There is, of course, some validity to these arguments. It was inevitable that American industry would lose relative market share as other countries recovered from World War II. It is not inevitable, however, that we experience declining real wages and profitability, nor is it inevitable that U.S. companies lose their share of American and world markets in areas like telecommunications, microelectronics, and services, where we have overwhelming technical superiority.

Nor can we be complacent about the loss of manufacturing and the shift to services, because high value-added services are related to high value-added manufacturing. If we lose manufacturing, we will lose the banking, insurance, transportation, advertising, and consulting services related to that manufacturing. Moreover, while there are some high productivity services, generally services have lower productivity and therefore lower wages. There likewise are very important synergistic relations between technology, learning, and manufacturing. Technological innovations are made concrete by embodying them in manufactured products. The cumulative nature of technological innovation requires continuous incremental improvements. Therefore, the loss of manufacturing implies a loss of important learning opportunities. Finally, our trade problems will not be solved by exporting services, because the international service trade is

relatively small and even less open to American companies than manufacturing.

Thus, manufacturing is critical to our technological innovation and these innovations are critical to competitiveness.

Whoever owns and improves technology has a tremendous competitive advantage. If we lose our technological lead, we must compete mainly in terms of prices and wages. As a high-wage country, we will lose most wage-cutting contests with other countries and our real wages will decline. Wage-intensive competition is one of the reasons much of the industry in the South is on its way to the Third World.

There are many reasons for our loss of competitive advantage. No useful purpose is served by assigning blame -- there is enough to go around. We must recognize that all of our major institutions are responsible because all were parts of the earlier, mainly goods-producing economy. That economy served us well from 1945-65, but its institutions and policies are inappropriate to an internationalized information world, where we must pay much more attention to the coordination of our macroeconomic policies with those of other countries; high priority also must be given to the revitalization of floundering international economic institutions and obsolete international economic policies.

The effectiveness of U.S. economic policy has been diminished by (a) internationalization, which weakens the effects of national policy actions in domestic markets -- actions that often have negative effects on other countries, and that boomerang back to the U.S.; and (b) by the growing complexity of the national economy (requiring less general and more targeted approaches). Above all, in an internationalized environment, federal policies must do much more to complement market forces with competitive strategies. Reactive, uncoordinated, and passive federal industrial policies cause major problems for American producers in a world where our strongest competitors have better coordinated, active strategies to strengthen their economies, often at our expense.

Public policies are important to competitiveness because they condition the climate for productive activities -- especially the stability of economic conditions, the degree of competition in markets, and the cost and quality of capital, technology, and labor.

It is not hard to demonstrate that much of the responsibility for the loss of competitiveness of American industry rests with inappropriate federal policies that have put U.S. producers at a serious disadvantage through: (1) unstable economic conditions; (2) taxes and other policies that create disincentives for productive investments while encouraging functionless corporate activities that bid up the price of existing assets and do nothing to create new wealth; (3) fiscal and monetary policies that reduce savings, increase real interest rates, and overvalue the dollar; and (4) passive and ineffective trade policies that give foreign companies unfair advantages in American markets.

What is needed at the federal level is a burst of creative pragmatism as we had immediately after World War II, leading to practical, non-ideological approaches to our problems. Fortunately, there is some basis for optimism because the states, which are mainly responsible for the critical human resource development functions, are currently experiencing such a burst of creative pragmatism. In our present situation, we would be in even more trouble than we are if the federal government had greater responsibility for this vital policy area. Our economic position nevertheless depends heavily on improvements in federal, as well as state and local, policies and on much better coordination between the public and private sectors.

Within the framework of public policies, competitiveness is mainly a matter of company strategies and management systems. Some of our companies with very good strategies have been damaged by inappropriate federal policies, but too many of our companies have obsolete management systems. These managers are motivated too much by short-run profits and therefore have no long-run competitive strategies, which now must be global. This has caused them to neglect productivity, quality, flexibility, and technological innovation in favor of quick paper profits. These kinds of activities are encouraged by the short-run orientation of most of our financial institutions.

Thus, while strengthening our learning system is very important to our national competitiveness, we must place it in perspective as one vital component of such a strategy.

The maintenance of competitive advantage for high-wage countries probably also requires the transformation of management and industrial relations systems. In particular, there must be much greater emphasis on flexibility, productivity, and quality output than during the 1945-65 period, when production was mainly of goods for domestic markets. Now 60 percent of the work force is in the information occupations and only 25 percent is in the goods-producing sectors. Traditionally, the American system has emphasized security through growth (which was relatively easy from 1945-65), long-term contracts, pattern bargaining, contractual rights, regulations, and fixed prices and exchange rates. International competition has caused all of these things to give way to security more through productivity, quality, and flexibility.

What are the implications of these developments for skill development and learning? Some economists believe these changes -- especially technology innovations -- imply deskilling. This view is based on the assumption that machines will replace skills and also results from American "scientific" management practices that have stressed deskilling and job fragmentation in order to give management greater control of the work. Others argue that the new technology and the requirements of international competition necessitate higher levels of education and more skills, especially in technical and computer areas.

What is the evidence? It is actually conflicting. There is no question that new skills will be needed or that many jobs will continue to require limited levels of education and that some skilled jobs will be deskilled. Moreover, there is no question that many American management systems have stressed job fragmentation in order to give management greater control or to make it possible to substitute unskilled or semi-skilled workers for those with more skill. Many managers -- perhaps most -- will resist providing greater worker participation in management decisions, especially about the introduction of technology. The question, of course, is which practices will be most compatible with the efficient use of technology and the conditions necessary for survival in a more competitive and dynamic international environment. The basic question, however, is whether or not authoritarian management systems meet the requirements of international competition.

The deskilling controversy is not easily resolved, partly because of uncertainty and partly because technology gives managers and national policy makers a variety of choices. Technology is an important molder of social and economic relationships, but it is not independent of those relationships.

Despite uncertainty, the evidence suggests to me that in order to maintain their real wages, workers will need more and different levels of education and skills, not less. This conclusion is based on the following reasons:

1. Both the technology and international competition will cause rapid change and displacement. This will put a premium on broad academic and technical skills -- which help workers become more flexible and adaptable.
2. Several features of what probably will be the most competitive work places also imply different skills and knowledge than required in a mainly national goods-producing economy:
 - More technical knowledge will be required because of the pervasiveness of technology.
 - Technology is, in addition, likely to displace workers from the least skilled work and to require workers to have more problem-solving skills. This puts a premium on conceptual (abstract) knowledge of things that are not visible. Thus, rapid change and the technical requirements of the emerging jobs will attach a heavy premium to learning skills.
 - Production is likely to be more coordinated and collective rather than individualistic. This will cause workers to need more communicating and interpersonal skills. They will particularly have to communicate technical material with a high level of precision.

- These developments also are likely to change the relationships between workers and managers. Efficient, competitive systems will have fewer managers and the relationships between workers and managers will be blurred. There will be fewer supervisors because the most efficient systems will have more worker participation and because information technology will displace many middle managers, whose work is mainly shuffling papers, a task performed more efficiently by computers than by people.

- Worker participation and ownership will provide incentives for workers to become more identified with their enterprises. Identification will be required because productivity and quality output will cause workers to be more responsible for work processes. In fact, workers will have to become more heavily involved in company decisions to ensure that those decisions reflect the interests of workers and communities. The decisions of multinational corporations (MNCs) do not necessarily reflect the interests of their employees, or the communities and countries in which they operate. American, Japanese, and other international experience suggests that workers who are motivated to maintain or improve their jobs and incomes through expanding market shares can be very competitive with MNCs that have high profit thresholds and attempt to maximize short-run profits. Thus, worker ownership and participation in management will require higher levels of understanding of global business strategies as well as the technical aspects of production.

- Several developments will provide greater incentives and opportunities for workers to train and educate themselves on a continuing basis. First, the availability of more highly educated workers will create competition for jobs. In some sense, supply drives demand for educated workers as much as demand drives supply, not only because the availability of trained and better-educated workers will cause employers to select them, but also because those workers are more likely to create their own opportunities. Second, since it will be difficult to determine what individual workers do in the internationalized information world, they increasingly will be paid more according to what they know, not what they do. Compensation systems that provide flexibility in adapting to changes, as well as greater incentives for quality output, will combine wages with bonuses and ownership returns.

- Although traditional "scientific" management systems have attempted to fragment skills, they never were able to do so completely, partly because scientific management was based on the fallacy that there was "one best way" to do a thing. There is, in reality, no "one best way," since optimal production processes depend heavily on the realities of each work place. Scientific management also was stymied because many processes were too complex to be fragmented or transferred to machines. It probably will be discovered that the most efficient use of information technology is to decentralize it to the workers and not centralize it in engineering departments. This is because the flexibility in that technology will make it possible to produce shorter production runs by simply reprogramming the computer rather than the more costly retooling required of hard automation. Hard automation permits start-up losses to be recouped through mass production -- spreading costs over more units of output. Moreover, information technology is not as easily used or as trouble-free as its producers imply. This puts a premium on high-level and flexible skills by workers on the work floor. These workers will understand both the technology and production requirements and therefore can correct machine errors in a hurry. The interdependence of production makes it imperative that errors be detected early; otherwise, defective components will be embedded in equipment and discovered only by massive and expensive failures.

- Finally, the close relationships between enterprise successes and national policies will require educated worker-citizens who understand their politics, economics, and societies, as well as their jobs.

Vocational Technical Education

What is the role of vocational-technical education in this overall process? Some critics argue that vocational education should be eliminated or greatly minimized. In this view, vocational education is obsolete because it prepares people for jobs that no longer exist and is inferior because it has been used as a dumping ground for poor students who are not likely to make it in "superior" academic tracks. The critics of vocational education also point out that the vocational-technical system is inflexible because it teaches mainly what the teachers know how to teach (like agriculture and home economics), not what the students need, and instruction is in necessarily unrealistic settings and with obsolete equipment. Critics usually point out that it would be much better to teach academic subjects, or basic education, and then let students learn vocational subjects on the job under more realistic conditions.

What about these arguments? There are a number of points which should be stressed:

1. It is very difficult to generalize about vocational-technical education. In too many cases, it deserves the criticism. There clearly has been a general tendency for vocational-technical programs to be too inflexible, though not necessarily any more so than many "academic" curricula. On the other hand, there are many superior programs that do a better job of teaching "academic" subjects than their traditional academic counterparts.
2. Nor can there be any doubt about the need for strengthening basic literacy, numeracy, communications, learning, conceptualizing, and reasoning skills. It is impossible to have really effective technical education without these basic academic skills.
3. Much of the criticism of vocational-technical education is biased and ignores the values of strong vocational-technical programs, as well as their potential in a reformed education system. There is a bias in academic circles against "soft" vocational areas relative to more abstract subjects, which are considered to be more prestigious and demanding. Much of this is elitism and much abstract work might be "rigorous" but also irrelevant and wrong. Some academics had rather be rigorously wrong than vaguely correct. A consequence of this bias is for those academics to assign second-class status to vocational-technical subjects and therefore make self-fulfilling prophecies of their criticism of the vocational-technical education system.

Moreover, when vocational-technical programs come under the direction of educators with anti-vocational biases, they can weaken the effectiveness of the programs by diminishing their practical technical content in favor of more "academic" subjects.

Most importantly, however, the critics of vocational-technical education make a false distinction between "vocational" and "academic" education. If taught right, technical education always required considerable "academic" content -- and this will be even more so in the future, as workers will have to have higher theoretical and conceptual skills. Indeed, most abstract and "academic" subjects can be taught more effectively through hands-on experience than through more academic classroom exercises. In fact, learning probably is always more effective with the unity of thought and action.

Moreover, in an internationalized information world, educated people increasingly will need knowledge of technical subjects. Those societies that give attention to technical subjects probably will be able to disseminate technology much faster and make more effective use of it than those that neglect technical subjects. Similarly, educated people must understand technology in order to make intelligent decisions about it.

Thus, education reform should attempt to unify "technical" and "academic" subjects, not deemphasize the former. It is, moreover, not hard to specify what is required to improve vocational-technical education. Reform must start by attracting and retaining more highly paid teachers, motivating students, maintaining rigorous standards, and combining academic subjects with training on the most modern and up-to-date equipment possible. Improving the quality of teaching sometimes will mean attracting teachers from the private sector. Indeed, there is a need for much closer interaction between educators and industry, including the involvement of teachers and students in private sector research and development activities. In fact, a major requirement of upgrading vocational-technical education is more research and evaluation with respect to these programs and building research and evaluation skills into their curricula. These activities could strengthen the status of teachers and the quality of the vocational-technical learning experience. The involvement of industry leaders in education programs could strengthen education and productivity, as well as overcome the biases they both have about each other.

The learning business is far too important to our economic and national welfare to let it be isolated from the economic world. Moreover, most businesses are themselves major learning systems. Some even give academic degrees. Many work places in the internationalized information societies look more like graduate schools than factories.

We also need to recognize some of the same principles in reforming education as any other system. We have to understand the nature of the system we now have and the one we would like to put in its place. It is particularly important to recognize the fact that we are dealing with systems that have interrelated components. In any system incentives and measurements are important, and in any system you will get what you reward and measure. We cannot say we want trained intelligence in students and reward schools for average daily attendance, the quality of their athletic programs, or the political influence of their graduates. Similarly, we cannot say we want good teachers and provide little respect, inadequate compensation, or working conditions that insult their dignity and sense of professionalism. We cannot say that people are our most important asset and pay as little attention as we do to learning systems in our strategic planning.

Educational Equity

In reforming the education system we must not let vocational-technical subjects be ignored or continue the artificial split between "vocational" and "academic" subjects. We also should discontinue the practice of dumping disadvantaged students into inferior vocational programs, wherever that continues to be done. As we reform the system, major care must be taken not to push low-income or disadvantaged workers out of these improved learning systems. This is so for equity and economic reasons: equity, because we will not have a stable society without major attention to a more equitable sharing of the benefits and costs of change than is currently the case; economic, because all of the net labor force growth over the next three decades will be minorities and women. In 2015, for example, there will be 91 million minorities in the U.S., three million more Hispanics than blacks. They will be 34 percent of the work force -- because whites are much older on the average and more likely to retire. How well we educate and train minorities now therefore will have a very important bearing on the future economic and social health of our country.

Conclusion

Internationalization, technological change, and an increasingly complex economy have caused many of the institutions that served us well in the 1945-65 period to be obsolete. As a consequence, American companies are losing their competitive position, even in the American market, and even in the high-tech areas where we should have competitive advantage. All major groups share responsibility for these problems, but major problems are caused by passive and

ideologically impaired policies rather than the creative pragmatism that characterized the 1945-65 period. Federal policies have created economic instability, and they provide incentives for companies either to engage in unproductive speculative paper investments, to concentrate in sheltered defense industries, or to leave the United States. Similarly, traditional American management and industrial relations systems are too authoritarian and adversarial and give far too little weight to some matters that are critically important in an international information world, especially productivity, flexibility, and quality.

In dealing with all of these problems, we must pay major attention to human resources, which have accounted for most productivity improvements since 1929, when we started keeping such statistics, and will become even more important in the future.

There is no doubt that major attention must be given to our technological and organizational advantages if we are to remain a high-wage, high-income society. This requires major attention to the learning systems, one of which is vocational-technical education. Critics argue that vocational education should be deemphasized in favor of greater attention to academic subjects. But this argument poses a false dichotomy. Educated workers and citizens must have a much better grasp of technology and vocational-technical subjects must have more "academic," abstract, theoretical, and conceptual content. Moreover, these "academic" subjects can best be taught through the unity of thought and action exemplified by world-class vocational-technical programs.

Reforming these programs will require more attention to standards, motivation, modern technology, and relevancy. Reform must begin by attracting and retaining very high-quality teachers. This requires, in turn, higher salaries and much greater teacher control of the learning system. There must, in addition, be closer relations between learning systems and other production activities, and the importance of the learning function in strategic thinking and planning at every level must be elevated.

A world-class education system will cost money, but we should view this as one of our most important investments -- at least as important as physical capital investments -- which is currently reflected in American tax or other economic policy. We can gain some resources by making learning systems more productive, but this will not be enough. We should remember, however, that human resource development pays high dividends and it will be very costly to the individual welfare of Americans and our national economic and political power if we fail to make these investments.

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The New Economy: Hope Versus Realities

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Figure 1 delineates what I would call the broad outlines of the information economy. By way of definition, the information sector consists of the services, trade, finance, insurance, real estate, communications, and transportation industries. The goods sector is comprised of the remaining industries, basically manufacturing, mining, and construction. The upper part of Figure 1 shows a very obvious trend. Here we are examining the shifting composition of both output and profits in the two different segments of the economy. The information segment of the economy has been gradually gaining output share over the last fifteen years, so that it is now in excess of 60 percent of our national output. By contrast, the goods segment of our economy is now below 40 percent of our national output. In terms of profitability, the information sector has reached a point where it accounts for over 50 percent of corporate profits in the United States – a dramatic increase of earnings leverage in this sector.

Figure 2 illustrates how the internal structure of the economy has adapted to what Dr. Marshall called the "international information economy." It shows the shifting composition of both employment and investment growth in the United States over the last 25 years. We have broken employment down into two groups of workers—information workers and production workers. Information workers now account for close to 60 percent of the total work force in the United States. Production workers are mainly operatives and assembly line workers who now account for less than 40 percent of the work force.

At the same time, there has been an equally dramatic shift in the composition of capital accumulation and capital investment in the United States. High technology has exploded over the last fifteen years. High technology capital now accounts for over 25 percent of total outlays for business capital spending in the United States. It is the single largest line item in corporate America's capital investment budget. High technology is no longer an infant industry on its way to growth; it is a rapidly maturing industry. Similarly there has been a dramatic decline in the share of investment outlays going to heavy smokestack machinery and equipment. They represent a conscious decision of corporate America to build a technology-based infrastructure for this new information economy.

Figure 3 illustrates where technology items—computers, communications equipment, instruments, and measuring and control devices—flow to in terms of our industry breakdown economy. The bulk of them flow to the information segment economy. Although this study was done for 1982 based on input-output analysis, we think it is perfectly relevant for 1985 and 1986 as well. Our estimates suggest that over 70 percent of technology shipments in the United States flow to the information intensive segment of the economy. In assessing the productivity potential of the information economy, we have to determine how effectively they are able to utilize high technology capital. This figure demonstrates that high technology capital is indeed the mainstay of productive activity in this new information economy.

Figure 4 analyzes investment in relation to employment trends in these two key segments of the economy. The investment flows on the top are more meaningful than the capital stock per worker shown in the bottom part of this chart. The thin line at the top examines the stock of basic industrial capital in relation to the total number of production workers in the United States economy. The capital stock per production worker peaked in the middle '70s and has been flat ever since. There has been no perceptible increase in the endowment of our manufacturing base

assembly line work force in terms of capital. Compare that with the capital endowment of the information worker in terms of high technology capital. In 1962 that capital endowment was less than half its counterpart in the basic industrial sector. In 1983 we moved into a zone of relative parity, but in early 1986, the average information worker was more richly endowed with productive capital than his counterpart in the factory assembly line.

This is the essence of a process that we have referred to as the industrialization of the information economy. The under-endowed information worker, who was clearly on his "assembly line" for a number of years at a distinct disadvantage in terms of productive capital, is now at least on a level playing field with his counterpart back in the factory. Over the broad sweep of economic history, the ups and downs of capital laborations like this certainly have been mirrored by comparable shifts in productivity growth. One would certainly suspect that as the capital endowment of this new dominant segment of the work force has risen, there would be a measurable improvement in productivity. Unfortunately, the numbers clearly demonstrate that if there is a major disappointment in the United States economy in the 1980s, it is productivity. We have had less than a one percent increase in productivity for our non-farm economy since 1980. We had no growth in 1985 and the number so far this year looked equally dismal.

Figure 5 estimates output per worker hour for information workers in both the goods sector and the information sector. Information worker productivity has been a real laggard, actually improving in the '60s and early '70s and stagnating ever since. Yet we have had an explosion of spending on high technology items—computers, communications equipment, instruments, robotics, and the like. The explanation is very difficult to discern at this point, and from a microeconomic point of view there really is no answer to point to. We can make some suggestions though. The emphasis so far in our new technology based economy has been in hardware—the trendy acquisition of the latest thing that blinks red and green lights. The emphasis has not been on applications, software, and until recently, operating systems. More importantly the emphasis has not been on acquiring the managerial skills needed to manage the information flow coming from this new technology. The interaction between people and hardware is sorely missing in today's "technological revolution." If there is one development in the economy that leads us to be optimistic about a resumption of more rapid productivity growth—though maybe not the 3.2 percent of the '50s and '60s—it is the dramatic effort to equip white collar information workers with productive capital. The problem is that we have not yet hit a critical mass in turning that capital into increased efficiency in the work place. We are now moving into a new era of the technology economy where the emphasis will be less on hardware and more on software, managing people, and managerial techniques associated with the dissemination of information.

We are no longer a closed economy. We are on the leading edge of the new economy, yet we are not immune—as we were in the '50s, '60s, and the bulk of the '70s—to international competition. One of the grimmest new realities of today's economy is the consequence of an overvalued currency, as illustrated in Figure 6. This has opened up the economy to intense pressures of foreign trade and import penetration. The dollar has retreated from the extraordinary highs of a year ago, giving up about half of the gain that occurred since 1980, but it is still very high relative to values that prevailed in the mid to late '70s. We still have major problems in our foreign trade deficit and we are facing a deficit of \$140 to \$150 billion this year as well. How does this development pertain to the new technology-based international information economy?

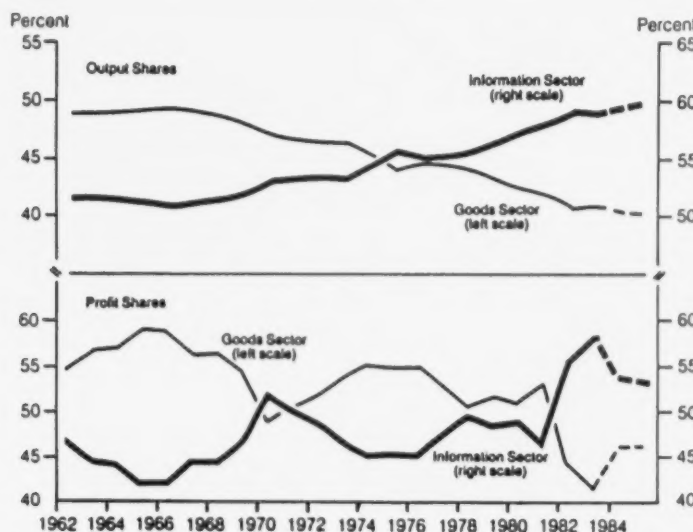
Figure 7 plots import penetration ratios, demonstrating that foreign producers have made dramatic inroads into what traditionally has been a safe haven for American producers, our technology markets. In fact, the import penetration ratios into our technology markets have risen by 50 percent since late 1982, twice the increase that has generally been recorded for other manufacturers. Hence, the overly complacent presumption that we have the leading edge in the technology business. The idea that we are immune to foreign computation and computers, telecommunications equipment, and so on does not survive the test of reality. We have lost a dramatic market share in our technology business. We are in an outright recession in the silicon valleys around the country. Though there is a little bit of light at the end of the tunnel now, the technology business in the last year has been on the skids. Part of the problem is the

disappointment with productivity payback. Figure 9 shows in detail that there has really been no part of the technology business that has escaped the erosion of its foreign trade position. The overall high technology trade balance has swung from a surplus of about \$13 billion in 1981 to a deficit of \$5 billion by the end of last year—a swing of \$18 billion that accounts for 40 percent of our drop in the capital goods trade balance in the United States. High technology is a major problem in this economy's ever-widening trade deficit. The most dramatic erosion came in the communications equipment area, though all segments—computers, office machinery, and instruments—also suffered fairly significant erosion of their trading position. The implications of this worrisome turn of events are frightening at their logical extreme: that the demand for technology goods is going to be increasing dramatically over the next several decades. The new information-based technology economy needs high technology equipment to keep the wheels of production going. But if the demand for technology continues to be fueled by foreign rather than by domestic production, we run the real risk that the productive infrastructure of our information economy will be built on a base of foreign-produced as well as foreign-owned capital. In short, American industry could be squeezed out of participating in the most dramatic structural transformation of our economy since the industrial revolution. Our competitive position certainly is a major concern to us. Germans as well as some Asian economies are surpassing us in terms of productivity growth rates (Figure 9). In plain and simple language, we are losing the productivity battle to our major trading partners, and raising very serious questions about the competitiveness of the U.S. economy in an increasingly integrated global system.

The bets have been made. We have both of our feet firmly planted in the new information economy of the 21st century. There was some initial hesitancy—at first we had some output lost and some jobs lost—but we now have made a major bet in terms of the acquisition of high technology capital by building a productive infrastructure for the information economy. Since we are no longer going to be counting on our smokestack industrial heritage, the information economy, today and tomorrow, holds the key to the future. And it is ultimately the information economy that holds the only real possibility for a reversal of the unfortunate turn of events. We are optimistic that as the emphasis in technology shifts, we can reverse the course of events. But that is a real challenge for political leaders, and it is certainly a real challenge for American industry. We have optimism, but so far, we have very little in the way of evidence.

FIGURE 1

The Emergence of the Information Economy



Source: Morgan Stanley Economic Research
Dashed lines indicate Morgan Stanley Economics projections

FIGURE 2

*Structural Change and the Information Economy
(Investment and Employment Shares)*

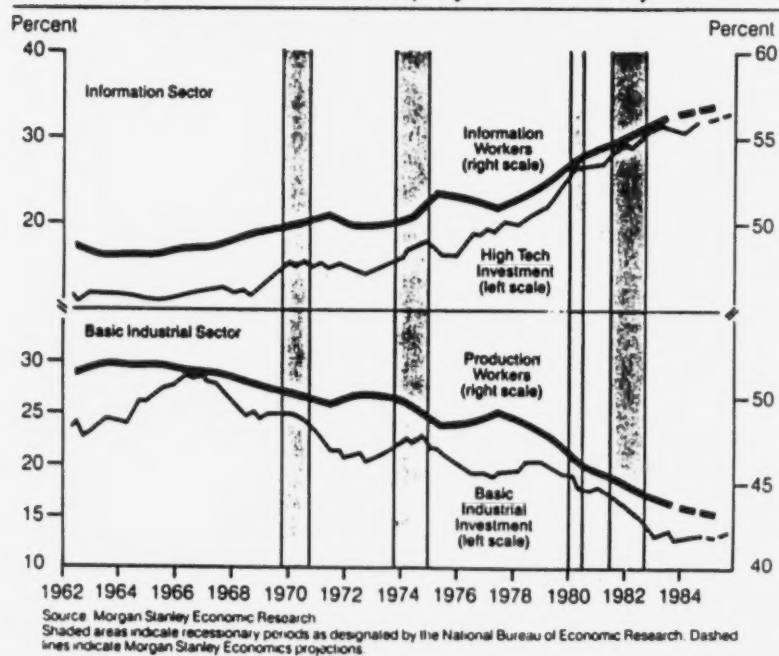
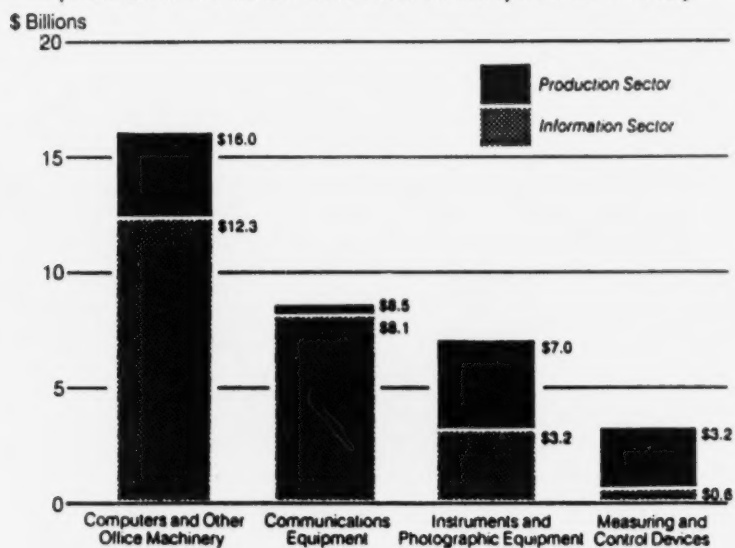


FIGURE 3

Who Uses High-Tech Equipment?

(Allocation of Private Domestic Final Shipments in 1982)



Source: Morgan Stanley Economic Research.
Estimates based on input-output industry distribution tables provided by the Interindustry Service of Data Resources, Inc.

FIGURE 4

*Investment and Capital Stock per Worker:
High Tech versus Basic Industrial*

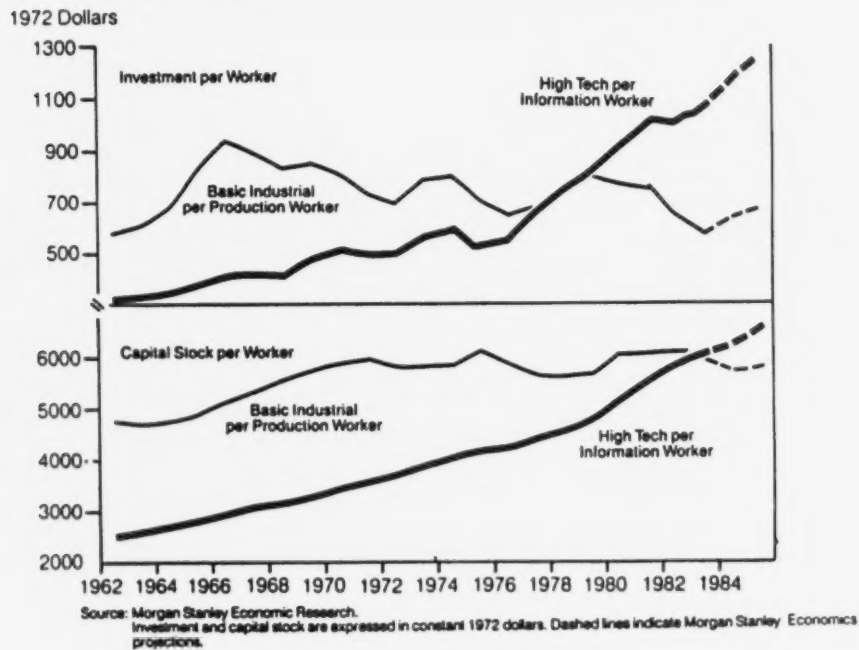


FIGURE 5

Productivity Disappointments

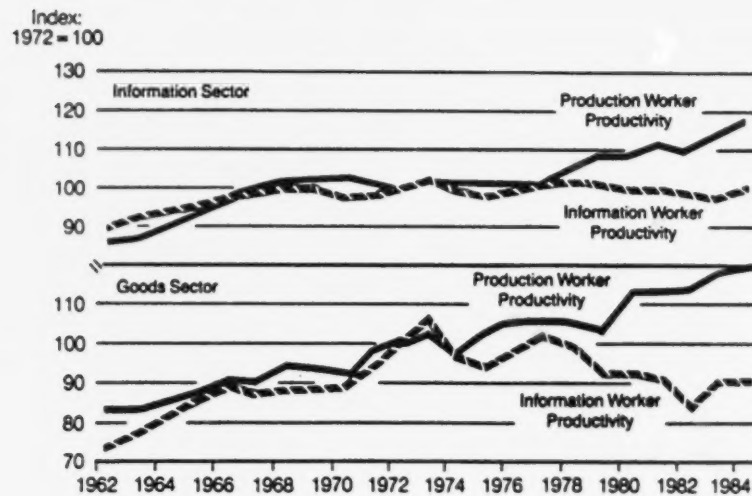


FIGURE 6

Trade-Weighted Value of the Dollar

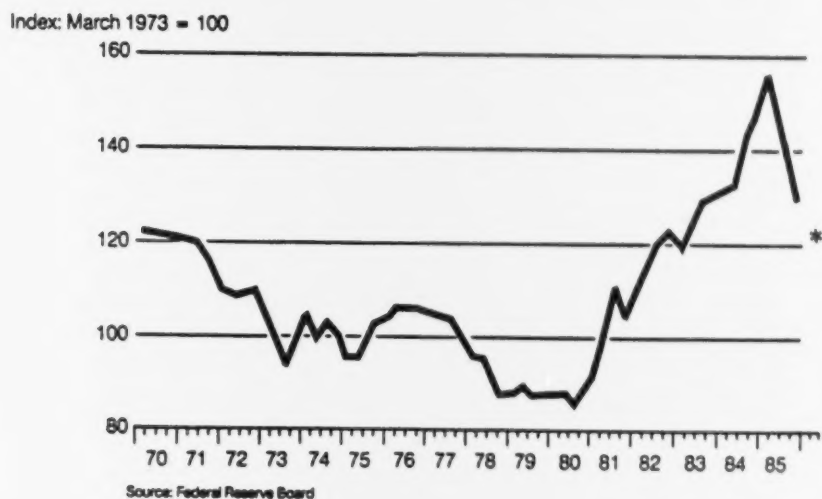


FIGURE 7

Import Penetration Ratios

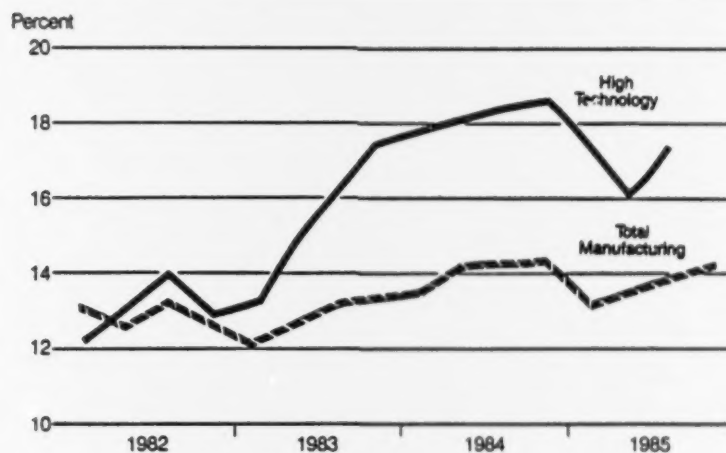
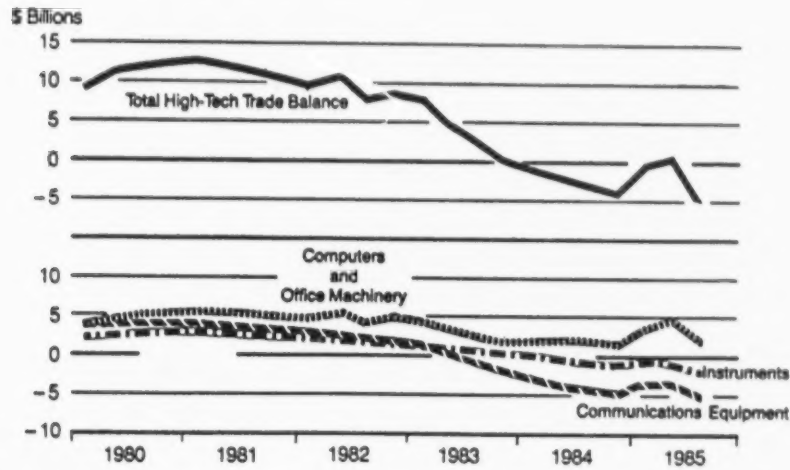


FIGURE 8

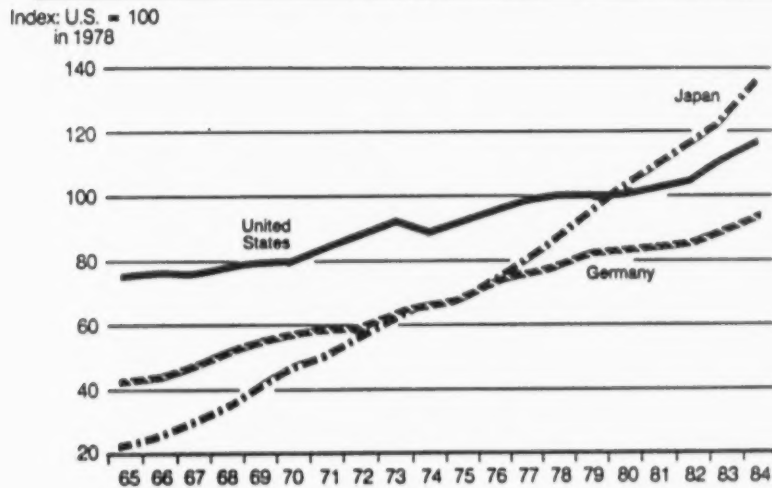
A Breakdown of the High-Tech Trade Balance



Source: Merchandise trade by end-use category, census-based tabulation of U.S. international transactions, Bureau of Economic Analysis.

FIGURE 9

Manufacturing Productivity



Note: Comparative productivity levels are benchmarked in 1978 according to the results of a study by the Japan Productivity Center. In other years productivity levels are computed by applying productivity growth rates to the 1978 benchmarks. Productivity growth rates by country are from the Bureau of Labor Statistics.

THE CONTENT: NEW CONCEPTIONS

Facing An International Economy: The Need for Structural Change in Education

Marc S. Tucker

Executive Director

Carnegie Forum on Education and the Economy

At a modern factory outside Seoul, Korean workers produce home video recorders sold under many brand names in the American market. They work seven days a week (with two days off a year), twelve hours a day. They earn \$3,000 a year. Though the American market for home video recorders is big, profitable, and growing fast, none of the machines sold here are produced in the U.S. We cannot, and do not wish to, compete with these Korean workers on their own terms.

Not long ago, domestic producers complained that the Japanese were able to undercut them with the use of low-paid workers. Later, many of these producers, along with many distributors and retailers, stopped complaining and contracted with low-cost producers in Japan for parts and finished products. It was widely assumed that America could continue to advance economically by producing the knowledge others would need to do the low-wage, low-skill work of actual production. Now the Japanese are looking over their shoulders at Korea, which is increasingly able to produce highly standardized goods at costs below those of the Japanese. The Japanese now realize that their continued economic progress depends on the production of goods and services that incorporate the state of the art in the relevant disciplines, something the Koreans are not yet very good at. So the Japanese are concentrating not just on superior manufacturing methods, an important factor in their success thus far, but on producing the knowledge needed to advance the state of the art, and incorporating that knowledge as efficiently as possible into production of new goods and services. It should come as no surprise that the Japanese are increasingly subcontracting to the Koreans those things we used to subcontract to the Japanese, the production of goods that require relatively low skill levels in the workers.

The Koreans are not likely to be content very long with their assigned role as provider of the muscle, while others provide the brains. Not long ago, an American executive of a firm that had just located a manufacturing plant in Singapore was told the following by a high official of the Singapore government: "You came because of our cheap labor and low taxes. You will stay because of the quality of our labor force."

Advancing technology and the changing terms of international trade are remolding the basic structure of international economic competition. Both technology and capital can now move across international borders with unprecedented ease and speed, seeking the lowest cost structures available for actual production. Products and services now made in the far corners of the earth can now be transported at very low cost to the world's largest markets. In those cases in which the products and services of interest can be produced by people with low wages, the technology and capital will move to their doorstep. By low skills, we mean here the 'basic skills' of minimum competence with written words and numbers, skills now possessed by many peoples of the world. These developments challenge the most basic premises of the American economic system. This country developed the world's most productive economy in part on the basis of mass production techniques that made it possible to employ workers with very low skills to turn out high quality, inexpensive products in great volume. The economic benefits were passed on to workers in the form of rising wages, which they used to create a steadily expanding market for the goods and services they produced.

The key was the machinery. Very expensive machines were designed so as to reduce to a minimum the skills required to operate them. The cost of the machines could be justified on the basis of the enormous market for the goods they could turn out, so the cost for each finished unit

was very low. This is precisely the game at which we are being beaten, because the same machinery is now available to others who are willing to work much longer hours than we are, at much lower wages, and markets are no longer national but worldwide. It is not at all clear that these new basic industry and mass production workers are being exploited; their condition is much improved from what it was only recently. Like the turn-of-the-century American immigrant, they are willing to work very hard because they see an opportunity to better themselves and the lives of their children.

If America wants to compete on the same terms as it did in the past -- making the most of the workers with minimum skill levels -- then it must accept prevailing world wage levels for low-skilled and semi-skilled labor. That is, we must be prepared for a massive decline in our standard of living. The alternative is to revise our view of the role of the worker in the economy. In the future, high-wage-level societies will be those whose economies are based on the use on a wide scale of very highly skilled workers, backed up by the most advanced technologies available. While it is easy to move capital and technology, it is exceedingly difficult to create and sustain the conditions under which very large numbers of people become and remain well educated. When they are well educated, they more than pay for their high salaries in the ease with which they can create, produce, market, and service new products and services that cannot be matched by less-well-educated work forces.

Despite the concern over the quality of education in this country in recent years, the Carnegie Forum does not believe that Americans fully understand the gravity of the situation just described. Much of the rhetoric of the recent education reform movement has been couched in the language of decline, suggesting that the problem is that standards have slipped, that the education system has grown lax, and needs only to be returned to some earlier performance standard to succeed. Our view is very different. We do not believe the educational system needs repairing; we believe it must be structurally changed, reflecting the structural changes taking place in our economy to prepare our children for productive lives in the 21st century. It is no exaggeration to suggest that America must now provide to the many a quality of education reserved until now for a fortunate few, that the cost of not doing so will be a steady erosion in the American standard of living.

The kinds of improvements in education we have in mind have little to do with quantity. Visitors to Japan and other newly successful countries on the Pacific rim report observing an omnivorous desire for information, a regard for learning, and a belief that effort devoted to education will be rewarded in many ways. By contrast, this country has produced schools in which real intellectual effort in school is frowned upon by most students' peers, is not demanded by parents, and is rarely rewarded in the work place.

Until now, the schools were not required to demand much in the way of intellectual effort of most students, because few graduates were expected to exhibit much intellectual achievement in the work place. Lip service is paid to the demands of an economy based on knowledge, but schools are still largely judged on students' performance on tests of the basic skills. It is very likely that, within twenty years, most high school graduates who have only what we now think of as the basic skills will be unemployable. Americans should be told that nothing of substance can be accomplished until expectations for their children have been radically changed.

It is not only possible, but necessary that sixth graders go on to the next level of schooling having learned to write a compelling essay, that junior and middle school graduates go on to high school having mastered statistics and probability, and that high school graduates be able to demonstrate a firm conceptual grasp of the principles of modern science. Even more important will be the ability to apply what has been learned to problems the student has never seen before, to work together with others on projects requiring joint effort, to understand not just what is so but why it is so, and to demonstrate a capacity for creativeness in all one does. It is these capacities and others like them that must characterize future American workers if our elderly are not to live in poverty, our children are to grow up healthy, and our families are to prosper in the decades ahead. These

goals greatly outdistance what has ever been achieved by most American schools. They imply a wholly new standard of performance.

With that as context, I will now speak directly to the question of vocational education. It grew strong in this country in the days I described earlier -- when it was necessary for only a few to be truly educated, and the rest could be merely trained for useful work. As I have just explained, if we wish to maintain our standard of living in this country, those days are over. Others in the world with equivalent skill levels charge far less for their services.

The implications are clear. If we are to provide for the many a quality and kind of education formerly reserved for a few, we can no longer afford to maintain the distinctions implied by the tracking systems in our high schools.

Most educators treat general and vocational programs as holding pens for those who they presume cannot make it, or do not want to try, in the academic program. It is important to understand that the distinctions between the "academic" track on the one hand, and the "general and vocational" tracks on the other, are very fuzzy in practice. The average academic track student takes almost as many vocational skill courses as the typical general or vocational track student. The real difference is the rigor of the academic courses. Though some general and vocational students take courses that do in fact give them skills that make them employable on graduation, the record shows that the value of most such courses peters out very quickly. This leaves typical vocational curriculum graduates to drift further and further behind as their inadequate education makes it progressively less possible to keep up with the twists and turns of the advancing economy.

The nation can no longer afford to maintain holding pens for its young. As the world economy changes shape, nothing could be more dangerous than the assumption that America can succeed if only a portion of American schoolchildren succeeds. By the year 2000, one out of every three Americans will be members of minority groups. One out of four American children is now born into poverty, and the rate is increasing. While it has long been possible for people to succeed in this society if they were simply willing to work hard, it is increasingly difficult for the poorly educated to get any but dead-end jobs, if they can get those. The social fabric will not long endure if a growing number of people cannot get work or look forward to improving their condition. Nor will the capital necessary for investment in a heavily technology-based economy be available if vast sums must be devoted to maintaining people who cannot contribute their share of productive effort. High school vocational education, as an activity separate and distinct from academic education, must go. In its place, we need to install a new kind of education for everyone. It must be intellectually demanding, but not academic. It must, as Ray Marshall sometimes puts it, be education that connects thought with action. Just as the student not bound for a four-year college needs a sounder academic foundation, the student who is bound for a four-year college needs an education designed to provide a constant interplay between theory and application, between head and hand, between ideas and the world of action. The academic curriculum needs change no less than the general and vocational curricula.

Creating a single, demanding curriculum for all students requires nothing less than the restructuring of our schools. There can be little doubt of the capacity of most children to perform way above present levels. One need only look at the accomplishments of other nations to see what might be accomplished. The challenge is to find a way to get radical improvements in student accomplishment without comparably great increases in cost. That is, the challenge is to greatly improve the productivity of our schools, and this challenge for public education is precisely the same as it is for American industry. This simplicity is no accident, because the root source of the pressure for productivity improvement in both sectors is the changing shape of the global economy. But it will prove much more difficult to change in the public sector, because the competitive pressures found in the private sector are missing.

If we succeed in making the necessary changes in the schools, then it should be possible to turn to post-secondary education -- especially the community colleges of this country -- to provide the necessary vocational skills on top of the solid educational foundation provided earlier. But I

anticipate the next panel, whose job it is to talk about new structures for vocational education. Enough for the present to make the case that if the question is what vocational skills should be provided in high school, it is the wrong question.

A View from Industry: Challenges for Worker Training

Harry W. LeColst
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Since I am not from academia or from the political arena, I probably bring a different viewpoint on economic growth and vocational technical education. I would like to make some observations on what I, as vice president and general manager of a large American industrial plant, see as the problems associated with trying to be successful.

One of the first and foremost problems today is competition. In the early days I remember competing with a few local companies. Today, we no longer compete just in our local area, or even with just other American companies. We compete aggressively worldwide, and that has increased very rapidly over the last ten years. Just a few years ago, we used to talk about the quality of the Japanese automobiles and whether we really wanted to buy one even though its price was attractive. Today that is no longer true. The nations of the world today are much more aggressive in all aspects of doing business than they were as recently as 10 or 15 years ago.

Looking not only at my own company's situation, but at all businesses, I ask myself what it will take to compete and to stay in business and to grow in the future? One of the key aspects will be the productivity of our work force. Productivity covers many aspects in our business including technology, quality, creativity, the people and morale of the work force. And it covers all of these areas very intensely.

Creativity is one of the key elements in business today. Should we design jobs to be labor intensive or should we invest heavily in capital to automate the job? What type of people will we need if we do automate? Another key element is technology, which generally comes from our scientists and engineers. Most engineers have gone through the university system and then gone out into the industrial world and created newer and better methods, machinery, and systems to perform day-to-day jobs.

The progress of our engineering leads to another element -- quality. The quality of the work that we do here in America is key to our economic success. If we produce a low-quality automobile, the Japanese are going to capture the market. If we produce a low-quality frying pan, then someone else who has a better product is going to capture that market, even at the expense of price. If an economic sector produces high value products, that sector will grow. The challenges that we meet on a day-to-day basis are how to improve both productivity and value. If successful, our companies will grow, and when they grow, they will contribute to our local economies.

One of the most important day-to-day problems that I face as a plant manager in trying to achieve that end is our human resources. Our plant is in a rural area of south Arkansas, in a small community of about fifteen thousand people. Within a radius of fifty miles there are several small towns of a thousand, or fewer, people. The people in those areas have been short-changed by their lack of education and inability to compete in labor markets. As a result, they end up as low-wage earners relative to the rest of the country. We have found through the years that the urban areas of the Northeast and the far West have been the loci for strong educational and economic growth. This has improved not only the economy of those areas, but the lives of the people and their standard of living.

The rural areas, which account for a large part of the South, have been given short shrift. What do we do about that? The people in these areas need jobs. Yet they have very little in the way of skills to sell, and it is a shame. For example, our company spends a considerable amount of time teaching people how to run new, automated equipment, but even after many months on the job they still struggle to understand the complexities of the operation of an automated plant. And

automation is critical to our productivity and competitiveness. Their failure to learn quickly enough frustrates us, so we hire engineers to make our automated equipment overly simple so that the workers can handle the tasks that they are not prepared to cope with. That's the biggest challenge for education.

When we discuss education, we often refer to the university system, the academic high school programs, or the vocational educational system. But these distinctions are not valid. I think we ought to talk about education in the future in terms of technical education. We face the question of whether to postpone vocational education until postsecondary education or whether we begin it following the eighth grade. My personal view is that a good many students, with proper counseling from their parents and the school counselors, will know what they want to do in life by the time they are coming out of the eighth grade.

I think we need an education system that takes those students who are not going into a technical university and train them both in academics and vocational-technical education, so that when they come out of high school they will be able to sell themselves to a local employer. They will have been trained in automotive mechanics, or electronics technology -- not engineering, but technology.

I found, when I worked at Raytheon Company, that four years of technical training, properly mixed and enhanced by academic training at a technical school, seemed to be the best mix. We find many students who are comfortable with that approach. They know they are not going on to a university, but they also know that they have to have skills that are marketable. I believe that certainly in our area of the country, if we could employ people who have "tools" to bring to the work place, it would help us to be more productive, be more creative, enhance our technology, and, the bottom line, help us put out a quality product at the least possible cost so that we can compete not only locally, but worldwide.

The management of our vocational education system also needs to be enhanced. Not long ago, I visited a vocational school that was set up as an example to the rest of the country. Yet, just a few years later when I toured that school, I observed out-dated equipment and lethargic management. The basic facility was in place, but it was not up-to-date. Instructors told me as I toured the school, which enrolled some four thousand students, that they felt discouraged because their facility was not given adequate support. They thought their students were being shortchanged, not only in the vocational or the technical area, but also in the academic area.

If we are going to compete worldwide in industry, we cannot be lethargic. We must be creative. We must increase our productivity. Industry provides the basis for economic growth. In our plant most of our equipment is computerized, micro-processor programmable, or numerical-controlled. We have difficulty finding people who even understand those words. Recently, when we acquired a Wang word-processor, no one in our high schools understood or could use that equipment. Nowhere in the area could we find people who knew what it was or had any experience with that particular equipment.

Yes, it is a challenge, but I think our people want challenge. Yes, it is complicated, and I think they want to meet the challenge of understanding it, so they can be competitive. On the other hand, I think it is fair to say that yes, we are paying attention: that's why we are here today. Yes, our standards are being raised, as Mrs. Clinton's committee on educational standards here in the state of Arkansas attests. In my opinion, that committee has performed one of the finest jobs done in many years, and I think our young people are going to benefit from it.

We are being challenged strongly everywhere today. Just yesterday I had a phone call from Germany from a corporation wanting to set up a joint venture here in Arkansas with our company to introduce a new manufacturing system making solid rocket propulsion motors. That technology does not exist in America, but it will allow us to save 25 percent on the price of that motor. That change came out of and requires creativity, energy, and aggressiveness.

Those are some of the problems that I see as a plant manager. If we are going to compete worldwide, we need to be better at what we do.

Commentary

*Jay Robinson**

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We are in a very competitive world market, and we are going to have to change our schools in order to provide the skills and knowledge to meet the challenge. We are going to have to do it quickly or we are going to find ourselves in very deep trouble.

The most effective way to change our schools, is to make sure that we have high quality teachers in the classroom in the future. It will certainly take radical and dramatic changes if that is going to happen. We must, however, succeed. This must not be a fad. It must change the calibre of young people coming into teaching, change the training they receive in the universities, and change the development they undergo once they are teaching. It must change the teacher's workplace, make it more attractive financially, require less paperwork, imbue teaching with more status, and do the things we have to do to get bright, talented people to teach. There is no need to talk about curriculum improvement unless there are good teachers.

As far as the curriculum is concerned, I believe it must be very rigorous from kindergarten all the way through high school if we are going to produce students with the skills that they are going to need to compete in the world market. The public schools through the twelfth grade will have to concentrate heavily on a solid basic skills education with a good program in the arts and instruction in foreign language.

In our current vocational education system, we are teaching those youngsters who cannot succeed in advanced math and science courses. I believe that we have created holding pens for our students. I am not condemning the vocational program or the vocational teachers, I think administrators are at fault. They have been the ones who have placed these children in holding pens and many of our minority students, our poor students, were simply placed in those courses when they could have been learning a much higher level of basic skills.

I don't foresee jobs in the 21st century for children in our schools today who do not have good basic skills, a good understanding of concepts, an ability to read highly technical manuals and to convert what they have read with logical thinking into productive work. We are not turning out all of our students with those skills. In our school system we have found that as long as our expectations are high, our instruction good, and we are willing to remediate our students, it is amazing how much they will achieve.

We, in North Carolina, are now involved in a comprehensive writing program where we are training forty-three hundred teachers how to teach writing. It is a shame the university never taught teachers, except in a few cases, how to teach writing. Every teacher in our system is taking training in how to teach writing, and the jump in the writing test scores this year from last year was the most dramatic change I have ever seen. The school system is letting our students and teachers know that writing is important, and all at once we are beginning to write again and write well. I think these are the kinds of programs we must have.

Every high school student in our system is required to take three years of math, three years of science, and three years of social studies. Foreign languages are offered now in grades 4-12, and many students are taking foreign language. Math and science in the higher grades are different for both the college preparatory student and the youngster who will be going into vocational education, but these requirements may be more important than any others.

I see vocational education becoming a more important part of the curriculum, but changing in form. At the high school level, it will be primarily a preparation for technical training after high

school. The director of our North Carolina community college system, former governor Bob Scott, is talking about a "2 + 2" plan, whereby juniors or seniors in high school can enroll in vocational courses in the community colleges. I am enthusiastic about it, although I am not sure we agree on what the two years in high school would include. I feel that the training in vocational education should be much broader than it has been in the past. Courses such as power technology or marketing should replace carpentry class. Youngsters can really learn an entire profession and specialize after they leave us.

It may be as important for many of our young people to get a taste of those various areas of work and learn that that is precisely what they do not want to do, rather than go out and pursue a career only to find out later they are in something they are unhappy with. We have a program called academic internship where our senior students spend six weeks out on the job, for example, in a law office, in the hospital, or in an architect's office. Recently a very bright young man told me, "My dad is a lawyer, my grandfather is a lawyer, and I am supposed to be a lawyer, but I have been sitting down there in that law library and I don't want to be a lawyer." He has convinced his dad that he doesn't want to be a lawyer. He is very bright and he will find something else. I think that's very important. I believe we need to expose our youngsters to many areas of work, let them find what they are highly interested in, and give them the basic skills at a level where they can succeed in that training once they leave high school. If we are going to compete in the world, at least fourteen years of education, two beyond high school, will be required of virtually all of our citizens.

* At the time this commentary was prepared, Dr. Robinson was Superintendent of the Charlotte-Mecklenburg School System, North Carolina.

Commentary

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Mr. Tucker asserts that economics play a large role in framing educational goals, and that is true. Further, he claims that time has changed expectations for quality, but not for productivity. I believe that somehow, in working to achieve productivity, we have forgotten something. That's the people who have to provide productivity.

We generally assume that more education alone will increase productivity and improve the quality of work, and that college will lead to maximum productivity. What does higher education mean today? We are preparing students to fill up our colleges and become scholars, and that's great. More students are scholars than ever before. We have a tendency, however, to forget that higher education in its beginning simply allowed a person to get more knowledge, not get a job. Benjamin Franklin was a scholar, but he became a millionaire first. I have yet to see in the newspaper, "Wanted: Philosopher -- \$60,000 a year," and until I do I feel there is something else that students need. They need not only to prepare for a job, they need to prepare for a career.

We learned from Mr. LeColst that competition, growth, and productivity, come from technology, quality, creativity, and morale. Technology, as it is projected to move in the next ten years, has to do primarily with communications and how people use data for information and manipulation. Quality in technological work is very important, as well as complex and frustrating because it is a state of mind, a behavior of caring, feeling and touching part of the whole. Vocational education for technical jobs must address both hand and mind, skill and behavior.

Vocational education has been maligned many times because people don't understand what a vocational program is. Vocational education deals with four things. It deals with equal access, so that people who learn in different ways will have an opportunity to pursue an educational career, an industrial career, or a professional career. It deals with quality, the same quality we talk about when we feel good about doing something. It deals with special services, to see that students understand what the purpose of the educational program is all about. Finally, vocational education is probably the only part of education that consistently has, and practices, accountability.

One research study concluded that most people learn in four ways. Type 1 learners perceive in a concrete, sensing-feeling way, and process in a reflective-watching way. They often ask 'why?' Type 2 learners perceive in an abstract and thinking way, and process in a reflective-watching way; for them the most important question is 'what?' Type 3 learners also perceive by thinking and abstracting, but they process by actively trying and doing. For these learners the most important question is 'how does it work?' Finally, Type 4 learners perceive through a concrete, sensing-feeling way and process by doing. These learners ask the question 'what if?' They seek to inspire other people and are often catalysts who make others excited about the learning process. They seek to synthesize skills and knowledge and personal meaning into something that creates a new experience for themselves and others. These learners understand and accept complexity.

The most consistent approach today in an increasingly interdependent world is a cooperative response, one that understands that while the issues are future-oriented, they necessitate action now. The role assigned to vocational education in the schools is to provide training and realism through analytical thinking. We must bring future consequences into the personal awareness of the young and help them to develop their reflective, rational skills for engaging in cogent decisions that go beyond the material gratifications of a free enterprise technology. There is no such thing as terminal education. The only thing a youngster has to do today is to determine whether or not they are going to work fulltime and continue education part-time or continue education fulltime and work part-time.

THE SYSTEM: NEW DESIGNS

Rethinking The Delivery Of Vocational Education In Secondary Schools

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Despite nearly two decades of research, three seemingly simple questions about vocational education have proven exceedingly difficult to answer: What is vocational education? Who are vocational education students? Does vocational education improve the employment prospects for those who participate in it? Answering these questions has been difficult, at least in part, because the role of vocational education in secondary schools has not been well understood.

Consider the transcripts of three students displayed in Table 1. According to the transcript file collected as part of *High School and Beyond*, a longitudinal study of a cohort of 1980 high school sophomores and a cohort of 1980 seniors, all three of these students graduated from high school in 1982. Student A probably conforms most closely to the typical image of a vocational education student. In the 11th grade, this student took one-half unit of Office Machines, one-half unit of Typing I, one unit of Business Math I, and one unit of Computer Science. In the 12th grade, Student A continued with one-half unit of word processing, one unit of Bookkeeping I, one unit of Business Math II, and one unit of Business English. From all outward appearances, this student is preparing for a job in one of the office occupations.

Student B completed only 1.5 units during the regular 11th grade academic year. From June following the end of the 11th grade through summer following the 12th grade, this student completed a total of 9.0 units, of which 4 units were earned in the vocational education curriculum - one-half unit of Office Machines, one unit of Business Math I, one-half unit of Home Maintenance & Repairs, one unit of Graphic Arts I, and one unit of Woodworking I. Despite the substantial number of vocational education units, it is unlikely that this student is prepared for any job related to this smattering of vocational education courses. Indeed, one suspects this student may simply have used the vocational education curriculum to mindlessly accumulate credits for graduation.

Student C, although apparently college bound, has also taken three vocational education courses during the 11th and 12th grade - one-half unit of Typing I, one unit of Electronics, and one-half unit of Woodworking I. The choice of typing and electronics is consistent with the student's academic interests, and woodworking was probably chosen because of general interest.

As the transcripts of these students demonstrate, students take vocational education courses for a variety of reasons, some educationally sound and others highly suspect. Moreover, it is difficult to judge the value or appropriateness of any particular vocational course when viewed in isolation from the rest of a student's choice of curriculum. A student taking Woodworking I may be actively pursuing a career in construction, interested in the course primarily for recreational reasons, or simply marking time until graduation.

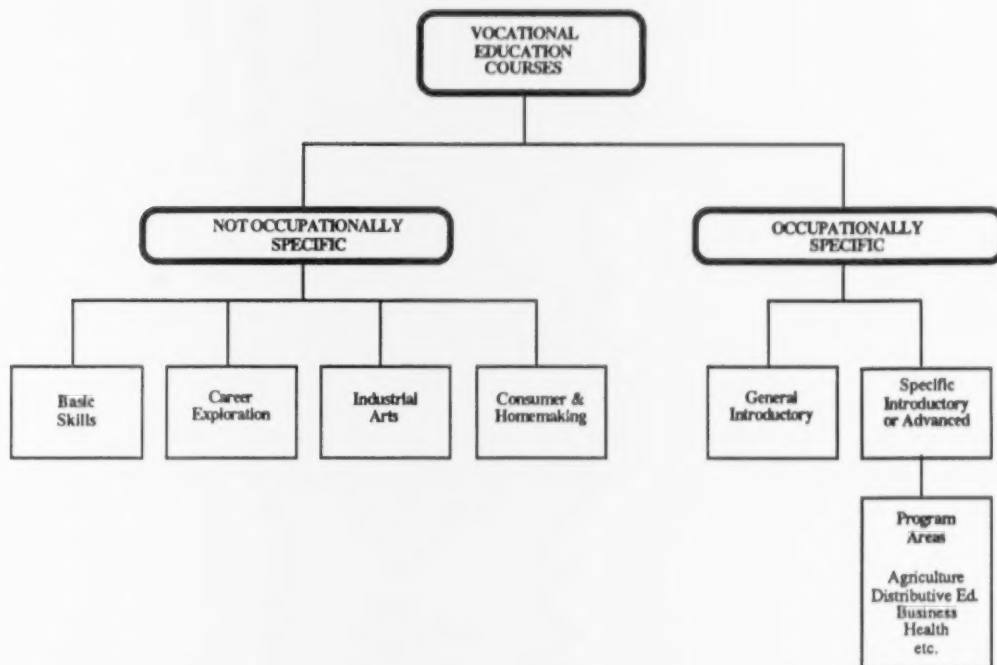
Therefore, to better understand how vocational education functions in the secondary system and how students avail themselves of these course offerings, we need a way to organize the delivery of vocational education courses. Figure I provides a useful taxonomy. At the most general level, vocational education courses are divided into two types - not occupationally specific and occupationally specific. In the first category, we include all courses that are not preparing students for a specific occupation or occupational area. These courses are further subdivided into four types: (1) basic skills (e.g., business math, business English, etc.); (2) career exploration; (3) industrial arts; and (4) consumer and homemaking education. Appendix A provides a complete listing of courses included in each category of the taxonomy.

The case for isolating these four types of courses is straightforward: none of these courses

Table 1
Three 11th and 12th Grade Transcripts

STUDENT A		STUDENT B		STUDENT C	
11th Grade	Credits	11th Grade	Credits	11th Grade	Credits
<i>Office Machines</i>	0.5	English	1.0	English III	1.0
<i>Typing I</i>	0.5	Music	0.5	History III	1.0
<i>Business Math I</i>	1.0	12th Grade		Algebra I	1.0
English III	1.0	<i>Office Machines</i>	0.5	Phys. Ed. III	1.0
History III	1.0	<i>Business Math I</i>	1.0	Physics	1.0
Phys. Ed. III	1.0	The Law and You	0.5	<i>Typing I</i>	0.5
<i>Computer Science</i>	1.0	Math - Basic	1.0	Art Appreciation	0.5
12th Grade		Phys. Ed. IV	1.0	12th Grade	
<i>Word Processing</i>	0.5	Consumer Chemistry	1.0	English IV	1.0
<i>Bookkeeping I</i>	1.0	Amer. For. Pol.	0.5	Amer. For. Pol.	0.5
<i>Business Math II</i>	1.0	<i>Home Maint. & Repair</i>	0.5	Calculus I	1.0
<i>Business English I</i>	1.0	<i>Graphic Arts I</i>	1.0	History IV	1.0
Phys. Ed. IV	1.0	<i>Woodworking I</i>	1.0	Chemistry	1.0
Geography	1.0	Art I	0.5	<i>Electronics</i>	1.0
Art Appreciation	0.5	Music Appreciation	0.5	<i>Woodworking</i>	0.5

FIGURE 1
TAXONOMY OF VOCATIONAL EDUCATION COURSES



has as its primary objective preparing students for paid employment, and hence none can be fairly evaluated on these terms. In the case of such courses as business math, imparting basic skills is the primary objective. These courses differ from their counterparts in the general or academic curriculum mainly in the types of examples that are used to impart basic skills. Career exploration has as its aim familiarizing students with the wide variety of career options available to them rather than preparing them for any single one. Industrial arts courses are not intended to prepare students for a specific trade or occupation but rather to familiarize them with the "culture" of the industrial world and expose them to the manual arts. Consumer and homemaking courses, as the name implies, seek to strengthen students skills as consumers, homemakers, and parents - roles performed outside the paid work force.¹

We divide occupationally specific courses into two categories: (1) general introductory and (2) specific introductory and advanced. All of these courses have as one of their primary objectives preparing students for paid employment in specific occupations or trades. In the general introductory category, we include the introductory courses for each of the seven major program areas: agriculture, business, home economics (preparation for paid employment only), health, marketing and distributive education, technical, and trade and industrial. We have chosen the term "general introductory" rather than "exploratory" because the latter term implies that such courses are the appropriate vehicle for students to experiment with different career possibilities. While this may be true to a limited extent, taking a large number of introductory courses in different program areas will generally be an inefficient means of career exploration and very wasteful of a student's limited learning time as a secondary student.

In the category of specific introductory and advanced, we include introductory courses in subareas (e.g., Introductory Drafting, Introductory Electronics, Horticulture I, etc.) in each of the seven major program areas, as well as the remaining advanced courses. Typically, these courses have as one of their major objectives imparting job skills that are specific to a particular trade or industry.

This taxonomy has several attractive features. First, it recognizes the diversity of objectives existing among different parts of the vocational education curriculum and helps to ensure that when outcomes are analyzed, the outcomes are consistent with the aims of different types of courses. For example, that part of the curriculum that is not occupationally specific is no more concerned than the general or academic curriculum with improving the specific employment prospects of students, and it should not be expected to produce markedly different employment outcomes for students who take courses primarily in this area of the vocational education. Second, it does away with the traditional categories of "academic," "general," and "vocational" that implied that each of these categories was mutually exclusive; the taxonomy will permit a more systematic analysis of the course-taking patterns of students in all aspects of the secondary curriculum. Third, the taxonomy does not require labeling a student "vocational," but rather enables us to ask four important questions about all secondary school students:

- What are the vocational course-taking patterns of secondary students?
- How many vocational courses do secondary students take in each category?
- What are the characteristics of students exhibiting different types of course-taking patterns in vocational education?
- What happens after high school to students exhibiting different patterns of course-taking in vocational education?²

Using data on the high school transcripts of the 1980 sophomores included in High School and Beyond, we are able to provide some tentative answers to these questions. During the next

three years, we will be analyzing these data more intensively, but this taxonomy and initial examination of the data offer some interesting findings.

How Many Students Take Vocational Education Courses?

Table 2 displays the percentages of students in the 1980 Sophomore Cohort of High School and Beyond who took vocational education courses during their high school careers. Over 90 percent of these students took at least one vocational education course. At this very general level, participation rates varied little by race or sex. Students from high-income families were somewhat less likely to have taken a vocational education course than students from low-income families, but the participation rate was still high, about 87 percent.

Over 80 percent of the students took at least one course in the non-occupational part of the curriculum. About half took courses in basic skill (typing, business math, and business English); 44 percent took courses in consumer and homemaking education, a third took courses in industrial arts, and 14 percent took courses in career exploration. Girls were somewhat more likely than boys to have taken non-occupationally specific courses.

Almost three-fourths of these students took at least one course in the occupationally specific curriculum, and 68 percent took some specific introductory or advanced courses. Although participation in the occupationally specific courses declined as family income and level of parents' education increased, more than 60 percent of the students in the highest categories of family income and parental education took some occupationally specific vocational education.

Although the table confirms that higher-achieving students, students describing themselves as enrolled in the academic track, students planning to pursue a four-year degree, and students who actually enrolled full-time in public and private four-year universities are all less likely to have participated in vocational education, participation rates among these categories of students were much higher than conventional wisdom might lead one to expect. Thus, almost 90 percent of the "academic" students took courses in the non-occupationally specific curriculum, and 66 percent took occupationally specific courses. Of those students enrolled full-time in four-year colleges in 1982, 59 percent of those at private schools and 68 percent at public schools had taken occupationally specific vocational education courses in high school.

How Much Vocational Education Did Students Take?

Table 3 displays the mean number of Carnegie units earned by this sophomore cohort in the secondary curriculum as a whole and in each of the major categories of vocational education. Overall, these students earned about 19.5 units during their high school careers. Vocational education accounted for 3.8 units, about evenly divided between non-occupationally specific and occupationally specific courses.

Among non-occupationally specific courses, consumer and homemaking education accounted for 0.59 units, industrial arts for 0.54 units, basic skills for 0.52 units, and career exploration for 0.21 units. In the occupationally specific category, general introductory courses accounted for 0.27 units, and specific introductory or advanced units for 1.66 units.

In all categories the amount of vocational education taken declined with increases in family income and parental education. However, even in the highest income and education categories, students earned an average of 2.5 Carnegie units in vocational education courses, with about half of these in occupationally specific areas. As one would expect, students who considered themselves "vocational" accumulated the greatest number of vocational education units, 5.4, with an average of about 3 units in occupationally specific courses. "Academic" students accumulated an average of 2.7 vocational units with 1.3 earned in the occupationally specific area.

Students who planned to pursue a four-year degree accumulated about 3 units of vocational education, compared to 5 units for those whose postsecondary plans were enrollment in a

vocational/technical school. Students actually enrolled full-time in public and private four-year institutions in 1982 had accumulated 2.1 and 2.9 units of secondary vocational education, respectively.

These figures reveal at least one very important fact. On the average, secondary students take rather little occupationally specific vocation education. Even those considering themselves "vocational" took an average of only 3 units of occupationally specific vocational education, and this was only 1.3 units more than students in the "general" track and 1.7 units more than students in the "academic" track. It is not surprising, then, that researchers have had such a difficult time detecting any impact of vocational education on outcomes. For most students, the time spent in occupationally specific courses is simply not that great, and the differences between "vocational" and other students are not as large as one might expect.

Many students, of course, do take a higher concentration of courses in both the non-occupationally specific and occupationally specific curriculum, and we will be analyzing these course-taking patterns in more detail as we proceed with our analysis of data from High School and Beyond. These preliminary findings, however, raise several important policy issues.

Policy Implications

With roughly half of what we conventionally think of as secondary vocational education being comprised of courses in the non-occupationally specific part of the curriculum -- i.e., courses which are not intended to prepare students for specific kinds of paid employment -- it is clear that we need to think critically about the role these courses play in students' secondary education. Given the renewed emphasis on raising academic standards, no doubt many would argue for eliminating the non- occupationally specific part of the vocational education curriculum altogether. For several reasons, we caution against subscribing too readily to this point of view.

First, much of the non-occupationally specific curriculum is concerned with imparting basic skills. Few will deny the importance of introductory typing, at least until the time when computers no longer require keyboards. The case for maintaining such courses as business math and business English is less clear, but the fact is that we know very little about the efficacy of these courses. Do they provide an effective alternative for imparting basic math and English skills to students who otherwise are unable to grasp these concepts? If so, these courses play an important role. Or are these courses merely watered-down versions of their more rigorous academic counterparts which less-motivated students will opt to ignore if easier alternatives are available? If so, perhaps they should be eliminated or substantially restructured. If, in fact, these courses represent a mixed bag of effective alternatives and "gut courses" where students can simply mark time, should we attempt to weed out the good from the bad, and if so, how should this be done? Until we have good answers to these questions, blanket condemnation of this part of the vocational education curriculum should be avoided.

With respect to the other areas of the non-occupationally specific curriculum -- career exploration, industrial arts, and consumer and homemaking education -- the central issue is not whether these courses belong in the secondary curriculum but rather how much of a student's secondary career can profitably be spent in these as opposed to other courses. Thus, many students may well benefit from a semester of career exploration. Similarly, a semester in industrial arts or consumer and homemaking education can prove quite valuable. Problems arise, however, when students mindlessly amass large numbers of credits in this part of the curriculum, using it as an easy way to meet lax graduation requirements.

The recent emphasis on tighter high school graduation requirements will, of course, eliminate much of the abuse of industrial arts and consumer and homemaking courses, provided there is sufficient monitoring of students' course selections and adequate counseling. Certainly, we all deplore the aimless accumulation of vocational education credits by Student B introduced at the outset of this paper. Yet recognizing the effects of fiscal pressures on schools' abilities to maintain

sufficient counseling staff, as well as the pressures to keep students in school, we can easily understand how these pointless course-taking patterns have occurred. However, it is not necessarily the individual courses that constitute the problem but rather the ways in which students are allowed to use them to put together a sensible secondary education.

With respect to the occupationally specific curriculum, it is clear that most students probably do not spend enough time in this part of the curriculum for it to have much impact on their employment prospects. Whether the experience has value, therefore, depends on a number of factors. First, there is the overall quality of these occupationally specific course offerings. Many of the more advanced offerings are not well suited to the comprehensive high school. They often require expensive equipment and specialized staff that are more economically provided through an area vocational school that can take advantage of scale economies and more flexible personnel policies. Comprehensive high schools can successfully offer some of the occupationally specific courses, but we need to learn much more about what types of advanced offerings are best provided through alternative delivery systems, such as vocational high schools, area vocational schools, and community colleges.

Second, the value of these courses will depend on how well they relate to courses a student has taken in the past and plans to take in the future. A semester of Woodworking I may make sense if a student earlier took a semester of industrial arts and plans to enroll in a community college carpentry program after high school graduation. It makes little sense, however, if it is merely one of a smattering of light-weight vocational offerings that a student dabbles in to obtain the sufficient number of credits for graduation. Wandering around the vocational education curriculum is a costly and ineffective approach to career exploration. We need, therefore, to think more carefully about how much direction should be given to students and under what circumstances we should place limits on a student's freedom to continue to take vocational education courses. Some careful research on the postsecondary course-taking patterns of students who took vocational education courses while in secondary school would yield some useful insights on this issue.

One way to encourage states and local school districts to consider more carefully the roles they expect from different aspects of the vocational education curriculum is to consider alternative approaches to the intrastate allocation of federal funds available under the Carl Perkins Vocational Education Act. Many of the past requirements affecting funds distribution have been relaxed under the new legislation, but essentially federal policy assumes that states will allocate funds based on a district's relative number of students enrolled in vocational education programs. Given the different objectives of different parts of the curriculum, as well as the different reasons students have for taking vocational education programs, enrollment-based funding may not be desirable. For one thing, it encourages states to maximize enrollment in vocational education courses whether or not this is in the best interests of students.

As an alternative, we should consider ways to distribute federal vocational education funds on the basis of desirable outcomes. For example, many states have begun to require competency-based curricula and competency-based testing in their vocational education courses. The practice is far from universal and varies within states, but federal policy could encourage these developments by requiring states to allocate federal funds based on the relative number of students achieving specified levels of competencies as measured by competency-based tests. For the occupationally specific courses, distribution could be based on the numbers of students completing vocational education programs, with "completion" defined as certifying that a student has acquired the basic and job-specific skills necessary to perform effectively in entry level positions related to training. To assess how well such a strategy might work, we need to know more about the experiences of states which have implemented competency-based curricula and other measures of program outcomes.

In summary, over the years vocational education has acquired a stereotypical image that is not well supported when one looks carefully at the course-taking pattern of many secondary school

students. It is not provided simply "for other people's children," as evidenced by the broad participation of students from all sorts of racial and socioeconomic backgrounds. The college-bound also take considerably more vocational education than the conventional wisdom would lead most to believe. To be sure, there are good and bad programs, and vocational education probably exhibits its own form of internal tracking and sorting. We need, therefore, a better understanding of what works and what does not work in vocational education, as well as what types of delivery systems are best suited for effectively providing different types of vocational education courses. A failure to meet this challenge will universally condemn vocational education to an unnecessary and probably undesirable death that is not warranted given our current knowledge and understanding about its place in the secondary curriculum.

¹ Some consumer and homemaking courses are intended to prepare students for paid employment in such fields as day care, nutrition, sewing, etc. These courses are included under the occupationally specific category.

² This last question will be examined in much greater depth in future tabulations. Analysis of this question in the first tabulation will be limited to the standard tabulation variables (see Technical Approach below).

Table 2 — Percentages of Students Who Participated in Vocational Education,
By Type of Course and Selected Student Characteristics

	Any Voc. Ed.	Any Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Home.	Any Occ. Spec.	General Intro.	Specific Intro./ Adv.
TOTAL	92.03	83.75	51.27	13.98	33.51	44.44	73.14	25.40	68.08
SEX									
Male	91.70	80.40	35.91	14.86	54.54	28.43	73.29	23.04	68.13
Female	92.37	87.06	66.47	13.10	12.70	60.28	73.00	27.75	68.02
RACE/ETHNICITY									
Hispanic	90.34	82.77	44.60	16.01	35.79	45.03	70.29	21.04	65.16
-Mexican	93.28	87.02	48.54	19.48	32.47	48.68	70.17	19.83	65.60
-Cuban	82.09	70.54	34.70	10.59	32.15	30.82	58.95	9.01	58.15
-Puerto Rican	84.16	74.23	32.47	12.43	39.80	28.30	66.31	16.97	62.80
-Oth Hisp	89.39	81.27	45.21	12.06	40.99	49.55	74.89	28.04	66.92
Am Indian	96.13	89.54	56.24	16.01	47.16	42.36	73.27	16.92	70.19
Asian	88.10	82.56	56.68	20.02	33.45	36.00	62.91	12.07	59.58
Black	91.29	83.22	45.20	16.11	28.29	51.74	69.46	25.28	62.99
White	92.26	83.78	52.85	13.13	33.96	43.38	74.29	26.43	69.43
FAMILY INCOME 80									
L1 \$8k	94.93	90.29	51.31	19.06	31.17	59.08	77.37	32.02	71.25
\$8-15k	94.87	88.28	56.30	15.42	34.51	51.26	79.36	30.79	76.66
\$15-20k	95.09	88.94	58.44	14.79	35.30	52.09	80.89	29.80	75.11
\$20-25k	94.49	87.70	57.27	11.46	34.45	47.54	77.14	26.46	72.84
\$25-30k	93.80	84.78	56.96	13.12	33.19	45.99	75.13	24.45	70.44
\$30-40k	93.28	82.28	54.56	13.67	32.63	40.98	76.95	25.92	72.69
\$40-50k	92.51	83.50	55.45	14.17	29.66	40.72	72.55	24.57	66.76
\$50k+	87.56	75.93	49.33	15.16	31.24	35.28	67.48	22.87	62.23
FAM INC CLEAN									
L1 \$8k	94.64	89.45	51.20	17.65	30.54	60.63	77.87	33.38	70.83
\$8-15k	94.86	88.17	56.56	15.57	34.35	51.22	79.33	30.57	76.81
\$15-20k	95.05	88.89	58.54	14.78	35.55	51.85	80.73	30.13	74.93
\$20-25k	94.54	87.76	57.31	11.55	34.24	47.25	77.03	26.25	73.01
\$25-30k	93.98	84.82	56.75	12.95	33.17	45.76	75.22	24.22	70.68
\$30-40k	93.20	82.35	54.54	13.63	32.64	40.97	76.78	25.90	72.54
\$40-50k	92.28	83.06	55.78	13.96	29.49	40.71	72.10	24.65	66.24
\$50k+	86.99	75.09	48.93	14.55	31.06	33.37	67.65	23.58	62.02
SES QUARTILE									
Low	94.58	87.67	51.04	15.48	34.78	53.97	77.24	30.05	71.80
25 to 49%	95.45	88.68	55.45	14.98	38.48	49.63	79.67	28.96	74.87
50 to 75%	93.61	85.53	55.50	14.35	33.18	45.42	75.26	26.42	70.57
High	88.19	76.74	50.71	11.93	28.89	33.64	66.69	20.26	61.70
PARENT HI EDUC									
L1 hs	93.66	87.15	48.68	15.45	32.45	50.51	73.69	26.74	69.74
Hs only	93.50	86.56	53.32	13.62	37.78	49.03	76.37	30.11	72.82
It 2yr voc	96.22	86.75	53.94	15.67	36.47	48.85	75.39	29.16	70.96
Gr 2yr voc	93.59	86.86	50.97	17.88	37.45	45.73	74.94	25.77	70.22
Lt 2yr coll	92.00	84.18	56.12	16.00	28.70	43.78	73.29	26.97	67.47
2-4 coll	93.98	87.17	54.41	13.62	33.35	45.41	74.77	25.38	70.71
4-5 coll	88.82	77.59	49.45	12.59	29.44	38.72	69.00	18.59	64.02
MA MS	88.61	77.79	50.14	10.47	26.92	36.39	65.72	21.70	60.20
PhD MD	84.47	70.48	44.89	8.69	26.65	27.15	60.10	17.08	55.86
OWN HOME									
Rents	91.45	82.64	49.75	14.26	30.99	46.92	69.52	25.02	63.88
Owms	93.18	85.19	54.39	13.68	33.12	46.20	75.19	26.44	70.45

Table 2 — Percentages of Students Who Participated in Vocational Education,
By Type of Course and Selected Student Characteristics — Continued

	Any Voc. Ed.	Any Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Home.	Any Occ. Spec.	General Intro.	Specific Intro./ Adv.
FAMILY SIZE									
1-3	90.78	81.35	44.24	15.41	31.75	43.25	70.37	23.92	64.39
Four	92.33	83.58	52.72	13.60	32.22	42.91	73.80	24.78	69.27
Five	92.43	83.57	54.74	13.50	33.78	41.64	74.22	23.92	69.72
Six	93.16	85.69	52.58	13.16	34.52	46.84	72.66	27.63	67.44
Seven	89.76	83.36	52.91	13.86	34.25	45.00	74.42	26.19	69.67
8 plus	92.51	85.14	50.46	14.43	35.75	49.37	73.66	27.31	68.42
HOME LANGUAGE									
Noneng mono	90.02	82.24	48.87	12.54	34.70	42.64	64.45	18.75	55.05
Noneng dom	88.13	81.13	44.31	17.67	37.30	38.58	68.50	18.04	65.18
Eng dom	91.94	84.24	49.88	12.69	32.51	44.41	71.74	24.50	65.88
Eng mono	93.64	85.02	53.57	14.08	33.28	46.57	75.27	27.16	70.22
HANDICAP STATUS									
In prog	94.80	85.46	48.08	15.38	38.17	48.58	73.82	24.58	69.48
Consist hcp	92.08	82.93	39.99	14.98	38.03	45.40	70.59	22.03	67.12
Incon hcp	91.26	82.88	48.87	14.21	34.67	45.33	72.02	27.46	66.28
Not hcp	91.86	83.83	52.92	13.67	32.49	43.84	73.44	25.21	68.44
COMM TYPE FE84									
Rural	95.32	88.55	55.78	12.94	35.98	50.61	79.86	32.93	75.14
City<50k	92.12	83.72	53.12	14.09	32.31	44.81	73.62	26.00	69.22
50<City<100k	91.97	84.38	53.66	12.45	29.67	45.29	70.30	23.63	65.12
50<Sub<100k	91.77	85.22	51.20	14.56	32.01	48.30	73.15	21.91	69.21
1hcCity<5hk	90.92	81.89	48.74	15.06	31.75	43.25	70.98	26.33	63.29
1hcSub<5hk	91.12	81.69	49.52	15.17	36.26	41.11	71.71	19.10	67.87
City>5hk	85.61	75.06	45.03	11.63	28.43	33.51	66.11	18.75	62.17
Sub>5hk	92.22	79.76	45.25	18.42	34.73	38.02	72.39	21.57	67.18
Milt base	94.44	87.83	36.81	16.98	59.47	42.22	77.30	27.40	69.01
PSE PLANS									
None	93.64	85.03	43.95	15.69	40.78	45.75	73.56	27.49	67.67
Voc/tech	96.37	90.14	53.39	17.34	41.72	54.64	82.83	32.06	77.62
Lt 4yr	93.59	88.23	59.06	14.97	32.87	48.77	79.18	28.57	74.86
BA BA	91.30	81.05	56.37	11.19	27.34	38.90	70.42	21.42	65.66
Adv deg	84.51	73.46	48.23	10.11	22.56	33.73	60.80	17.42	55.73
HS DIVISION									
No east	81.90	69.43	31.49	12.96	30.19	30.76	65.72	17.47	61.30
Mid atl	85.74	74.88	44.54	6.93	35.66	28.98	69.13	22.06	64.07
E no cen	94.03	86.59	51.33	14.46	37.15	50.54	77.60	32.74	72.39
W no cen	96.97	90.32	57.14	11.22	41.31	59.12	85.58	37.24	80.90
So atl	92.14	80.61	48.85	14.03	21.72	43.12	68.41	22.75	63.58
E so cen	93.19	85.09	57.39	9.97	31.16	45.41	72.17	33.90	63.54
W so cen	96.12	89.93	62.12	10.53	26.76	49.97	72.75	23.51	66.62
Mtn	97.83	93.73	61.94	16.00	44.11	48.97	78.77	17.54	74.79
Pacific	92.96	88.70	54.00	29.15	39.61	47.67	71.81	18.53	68.20
HS REGION									
East	84.64	73.32	40.79	8.66	34.09	29.49	68.15	20.74	63.27
North	94.84	87.61	52.92	13.57	38.29	52.90	79.79	33.97	74.73
South	93.63	84.46	54.69	12.18	25.00	45.78	70.49	24.90	64.58
West	94.36	90.14	56.28	25.37	40.90	48.05	73.81	18.25	70.09

Table 2 — Percentages of Students Who Participated in Vocational Education,
By Type of Course and Selected Student Characteristics — Continued

	Any Voc. Ed.	Any Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Homa.	Any Occ. Spec.	General Intro.	Specific Intro./ Adv.
HS URBANICITY									
Urban	88.77	80.91	45.36	14.10	31.70	39.73	66.03	20.73	61.11
Suburb	92.12	83.16	49.60	14.23	34.29	42.98	74.34	24.26	69.20
Rural	94.19	86.66	56.01	13.50	33.57	50.01	76.30	30.47	71.26
HS TYPE									
Public	92.90	85.29	51.46	14.84	35.23	45.99	74.65	26.09	69.59
Catholic	87.70	70.76	50.80	5.67	14.85	33.56	64.27	20.08	58.56
Oth priv	76.09	64.83	46.78	10.96	19.99	21.49	47.70	16.10	43.55
HS PROGRAM									
General	93.00	86.46	49.96	15.67	36.19	51.41	73.48	25.70	67.40
Academic	88.88	78.89	53.00	10.58	27.16	36.70	65.77	20.31	60.55
Voc/tech	95.62	88.23	50.36	17.03	36.24	49.05	83.30	32.32	79.55
HS GRADE AVG									
A	82.89	72.33	58.36	9.77	15.94	31.84	57.39	16.96	54.64
A to B	88.23	78.79	59.54	9.69	20.87	37.85	69.89	20.96	65.58
B	92.28	83.73	57.51	12.25	28.37	43.77	72.44	24.35	67.82
B to C	94.39	86.60	54.12	17.33	34.32	49.35	76.48	26.59	73.32
C	94.56	87.30	47.53	15.76	41.21	48.13	76.56	27.80	71.52
C to D	90.61	81.31	34.83	11.14	43.36	39.41	68.00	22.43	59.33
D	75.41	64.60	25.27	10.47	27.65	22.86	49.14	18.65	39.83
ABILITY QUARTILE									
Low	92.44	85.64	43.55	17.81	34.75	52.02	72.33	25.05	67.59
25 to 49%	94.50	89.03	55.99	15.55	37.93	50.73	79.55	31.72	74.04
50 to 75%	95.81	87.62	58.54	14.50	34.38	46.62	77.39	26.56	72.25
High	85.39	73.25	48.15	7.93	26.65	30.15	63.89	18.98	59.11
HS HOMEWORK									
Lt 1 hr/wk	93.92	85.95	39.73	17.18	49.31	42.69	73.68	25.06	68.57
1-5 hr/wk	94.42	86.71	55.96	15.13	33.76	48.70	77.62	28.01	72.52
5+ hr/wk	86.38	75.61	50.94	8.63	21.76	36.31	63.83	21.44	58.79
HS DIPLOMA									
Regular hs dip	93.64	85.63	55.61	14.55	33.59	46.67	77.03	27.37	72.48
Dip return	84.81	73.56	31.11	10.32	34.53	31.41	57.88	17.08	50.12
No dip return	83.25	77.15	30.50	9.70	35.24	35.15	47.19	16.41	40.14
No return	82.83	73.17	26.73	11.97	30.68	33.69	50.47	13.77	42.52
HAS CHILDREN									
None	92.27	83.79	51.76	13.84	34.45	43.32	73.93	25.43	69.06
Some	90.34	83.45	47.71	14.99	26.64	52.62	67.43	25.24	60.94
OCT82 PSE STATUS									
Pt pri4	86.57	79.17	40.32	12.03	33.62	39.19	68.82	15.07	67.19
Pt pub4	93.67	87.87	61.52	11.83	26.47	47.49	73.86	25.70	71.83
Pt pub2	95.15	87.40	61.80	17.76	31.15	51.39	80.08	29.55	74.49
Pt oth	94.03	86.29	46.88	30.14	31.13	46.26	82.70	19.06	81.31
Fi pri4	81.71	68.55	47.46	8.60	20.30	28.17	59.07	15.81	54.71
Fi pub4	90.63	80.53	55.88	9.06	24.55	37.35	68.42	21.57	63.89
Fi pub2	95.75	88.35	61.13	14.63	31.93	46.40	78.55	25.56	74.66
Fi oth	92.71	87.77	59.85	12.64	30.59	50.74	76.43	26.08	73.06
Not studt	93.06	85.52	46.94	15.93	39.17	47.69	74.78	27.80	69.09

Table 2 — Percentages of Students Who Participated in Vocational Education,
By Type of Course and Selected Student Characteristics — Continued

	Any Voc. Ed.	Any Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Homa.	Any Occ. Spec.	General Intro.	Specific Intro./ Adv.
FEB83 PSE STATUS									
Pt pri4	83.01	76.63	38.57	12.68	31.88	37.78	67.74	12.78	65.16
Pt pub4	93.13	88.76	64.25	7.66	24.56	51.95	68.10	24.45	65.04
Pt pub2	94.91	85.83	62.39	15.87	30.20	47.77	79.13	30.15	73.77
Pt oth	96.99	92.80	65.19	8.26	37.61	66.34	81.87	30.87	80.43
Ft pri4	81.83	66.73	47.22	8.62	20.29	28.38	59.63	16.08	55.00
Ft pub4	90.55	80.34	55.67	9.73	24.77	37.04	67.51	20.73	62.93
Ft pub2	95.71	87.91	61.21	14.54	32.96	45.87	78.20	25.77	73.98
Ft oth	91.54	86.58	61.12	11.77	28.41	51.39	78.31	27.47	72.73
Not studt	93.14	85.73	47.01	16.09	39.02	47.83	75.19	27.74	69.65
OCT82 JOB STATUS									
Ft job	92.55	84.17	47.11	16.13	42.40	42.79	75.97	26.38	71.12
Pt job	94.09	86.25	57.21	13.20	30.62	46.96	75.69	25.36	71.53
Unemployed	92.49	84.36	51.16	15.30	32.09	50.27	76.14	30.75	69.43
Not labor force	90.35	81.76	51.31	12.48	27.83	43.51	68.63	23.69	62.99
FEB83 JOB STATUS									
Ft job	93.04	84.65	47.75	17.01	41.22	42.79	76.83	27.48	71.71
Pt job	93.99	86.54	57.15	13.58	30.59	47.02	75.41	24.93	70.75
Unemployed	92.91	84.95	47.41	15.30	34.31	50.01	73.39	26.55	66.78
Not labor force	89.82	80.77	51.41	11.27	27.95	43.39	68.15	23.57	63.13

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Table 3— Mean Number of Carnegie Units Earned in Vocational Education,
By Type of Course and Selected Student Characteristics

	Total High School	Total Voc. Ed.	Total Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Home.	Total Occ. Spec.	General Intro.	Specific Intro./ Adv.
TOTAL	19.49	3.79	1.86	0.52	0.21	0.54	0.59	1.93	0.27	1.66
SEX										
Male	19.08	3.70	1.75	0.33	0.24	0.93	0.25	1.95	0.24	1.71
Female	19.89	3.89	1.97	0.71	0.18	0.16	0.92	1.92	0.30	1.62
RACE/ETHNICITY										
Hispanic	17.42	3.63	1.88	0.47	0.25	0.54	0.62	1.75	0.21	1.54
-Mexican	17.66	3.78	1.95	0.51	0.32	0.48	0.63	1.84	0.21	1.62
-Cuban	17.39	2.72	1.43	0.34	0.19	0.51	0.40	1.29	0.08	1.21
-Puerto Rican	15.07	3.06	1.45	0.35	0.16	0.58	0.38	1.81	0.17	1.44
-Oth Hisp	18.22	3.82	2.07	0.48	0.17	0.65	0.77	1.74	0.25	1.50
Am Indian	17.68	3.82	1.98	0.53	0.25	0.75	0.45	1.84	0.16	1.68
Asian	21.26	2.72	1.52	0.50	0.25	0.46	0.31	1.20	0.10	1.10
Black	17.73	3.68	1.83	0.47	0.25	0.36	0.74	1.85	0.27	1.58
White	20.07	3.66	1.87	0.53	0.20	0.57	0.57	1.99	0.28	1.71
FAMILY INCOME 80										
Lt \$8k	19.28	4.48	2.45	0.59	0.36	0.55	0.96	2.03	0.36	1.68
\$8-15k	20.53	4.56	2.16	0.61	0.24	0.56	0.75	2.40	0.34	2.06
\$15-20k	20.57	4.53	2.22	0.61	0.21	0.65	0.74	2.31	0.33	1.98
\$20-25k	20.90	4.18	1.95	0.59	0.18	0.59	0.58	2.23	0.29	1.94
\$25-30k	21.25	3.95	1.86	0.56	0.16	0.53	0.61	2.08	0.24	1.84
\$30-40k	21.69	3.95	1.84	0.55	0.20	0.56	0.54	2.10	0.28	1.82
\$40-50k	21.58	3.47	1.72	0.54	0.21	0.51	0.47	1.75	0.26	1.48
\$50k+	21.62	2.92	1.45	0.44	0.23	0.40	0.38	1.46	0.22	1.24
FAM INC CLEAN										
Lt \$8k	19.32	4.52	2.43	0.57	0.35	0.53	0.99	2.08	0.39	1.70
\$8-15k	20.52	4.57	2.16	0.61	0.24	0.56	0.76	2.41	0.34	2.07
\$15-20k	20.59	4.53	2.22	0.61	0.21	0.66	0.74	2.31	0.34	1.98
\$20-25k	20.95	4.16	1.94	0.58	0.19	0.59	0.58	2.22	0.29	1.93
\$25-30k	21.35	3.94	1.85	0.56	0.16	0.54	0.60	2.09	0.24	1.85
\$30-40k	21.72	3.95	1.85	0.55	0.19	0.56	0.54	2.10	0.28	1.82
\$40-50k	21.68	3.45	1.72	0.53	0.21	0.51	0.46	1.73	0.26	1.47
\$50k+	21.76	2.83	1.40	0.42	0.23	0.39	0.36	1.43	0.22	1.21
SES QUARTILE										
Low	18.55	4.51	2.23	0.56	0.24	0.59	0.84	2.28	0.33	1.94
25 to 49%	19.93	4.52	2.19	0.59	0.25	0.67	0.68	2.33	0.31	2.02
50 to 75%	20.44	3.87	1.85	0.55	0.20	0.56	0.55	2.02	0.28	1.74
High	21.46	2.78	1.40	0.47	0.17	0.40	0.36	1.39	0.20	1.18
PARENT HI EDUC										
Lt hs	17.66	4.17	2.05	0.52	0.22	0.54	0.77	2.11	0.30	1.81
Hs only	18.98	4.45	2.14	0.56	0.23	0.65	0.71	2.32	0.34	1.98
Lt 2yr voc	19.29	4.16	2.06	0.57	0.21	0.62	0.66	2.10	0.30	1.79
Gt 2yr voc	19.79	4.15	2.02	0.53	0.25	0.65	0.59	2.13	0.25	1.88
Lt 2yr coll	20.44	3.80	1.82	0.58	0.24	0.43	0.58	1.98	0.29	1.68
2-4 coll	20.28	3.60	1.80	0.56	0.20	0.52	0.51	1.80	0.25	1.55
4-5 coll	20.81	2.94	1.46	0.45	0.19	0.42	0.41	1.48	0.19	1.29
MA MS	21.31	2.62	1.33	0.44	0.12	0.37	0.41	1.29	0.21	1.08
PhD MD	21.15	2.44	1.22	0.45	0.13	0.35	0.29	1.22	0.20	1.02
OWN HOME										
Rents	18.07	3.66	1.85	0.52	0.22	0.46	0.64	1.81	0.28	1.53
Owns	20.61	3.89	1.89	0.55	0.20	0.54	0.61	1.99	0.28	1.71

Table 3— Mean Number of Carnegie Units Earned in Vocational Education,
By Type of Course and Selected Student Characteristics — Continued

	Total High School	Total Voc. Ed.	Total Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Home.	Total Occ. Spec.	General Intro.	Specific Intro./ Adv.
FAMILY SIZE										
1-3	17.42	3.44	1.74	0.45	0.27	0.48	0.53	1.70	0.23	1.47
Four	20.58	3.92	1.85	0.54	0.21	0.55	0.55	2.06	0.26	1.80
Five	20.43	3.67	1.80	0.53	0.20	0.55	0.52	1.88	0.25	1.62
Six	19.80	3.80	1.81	0.53	0.20	0.51	0.59	1.99	0.31	1.67
Seven	19.23	4.02	1.97	0.54	0.20	0.55	0.67	2.05	0.28	1.77
8 plus	19.01	4.05	2.06	0.53	0.19	0.61	0.73	1.99	0.31	1.69
HOME LANGUAGE										
Noneng mono	18.44	2.99	1.67	0.49	0.13	0.54	0.52	1.32	0.20	1.12
Noneng dom	19.11	3.60	1.80	0.46	0.34	0.57	0.43	1.80	0.20	1.60
Eng dom	20.45	3.40	1.70	0.50	0.15	0.55	0.50	1.70	0.26	1.44
Eng mono	20.02	3.97	1.93	0.55	0.21	0.54	0.64	2.04	0.29	1.75
HANDICAP STATUS										
In prog	19.70	3.96	2.06	0.47	0.33	0.59	0.68	1.89	0.24	1.66
Consist hcp	18.67	3.92	1.90	0.40	0.21	0.69	0.60	2.02	0.22	1.81
Incon hcp	19.13	3.84	1.91	0.51	0.21	0.56	0.63	1.93	0.30	1.63
Not hcp	19.66	3.76	1.83	0.54	0.20	0.52	0.57	1.94	0.27	1.67
COMM TYPE FEB84										
Rural	19.29	4.81	2.22	0.60	0.21	0.61	0.80	2.59	0.39	2.20
City<50k	19.87	3.92	1.92	0.54	0.21	0.54	0.63	2.00	0.27	1.72
50<City<100k	19.61	3.55	1.77	0.55	0.19	0.46	0.57	1.78	0.26	1.52
50<Sub<100k	18.89	3.75	1.86	0.54	0.19	0.53	0.62	1.87	0.23	1.64
1h<City<5hk	19.20	3.35	1.74	0.48	0.24	0.50	0.51	1.61	0.26	1.35
1h<Sub<5hk	19.86	3.50	1.77	0.49	0.22	0.57	0.48	1.73	0.19	1.55
City>5hk	18.20	2.69	1.25	0.39	0.13	0.35	0.39	1.44	0.21	1.23
Sub>5hk	20.36	3.31	1.59	0.43	0.30	0.46	0.39	1.72	0.21	1.51
Milit base	19.28	4.19	2.18	0.38	0.25	1.08	0.47	2.01	0.24	1.77
PSE PLANS										
None	16.67	4.39	2.14	0.48	0.31	0.70	0.66	2.25	0.33	1.91
Voc/tech	19.31	5.02	2.42	0.55	0.27	0.79	0.82	2.60	0.32	2.28
Lt 4yr	20.20	4.11	1.99	0.62	0.22	0.51	0.64	2.13	0.31	1.82
BA BA	21.49	2.96	1.48	0.54	0.12	0.37	0.45	1.48	0.21	1.26
Adv deg	21.52	2.31	1.17	0.45	0.10	0.27	0.35	1.14	0.17	0.96
HS DIVISION										
No east	18.68	3.28	1.38	0.36	0.16	0.51	0.36	1.90	0.26	1.64
Mid atl	19.90	3.37	1.53	0.51	0.12	0.58	0.33	1.84	0.26	1.58
E no cen	18.63	4.10	1.95	0.46	0.21	0.58	0.70	2.15	0.34	1.81
W no cen	21.52	4.56	2.16	0.50	0.15	0.65	0.85	2.40	0.34	2.05
So atl	18.79	3.51	1.68	0.56	0.22	0.38	0.52	1.84	0.24	1.60
E so cen	18.66	4.44	2.20	0.65	0.22	0.62	0.71	2.24	0.41	1.83
W so cen	20.17	4.04	2.11	0.65	0.18	0.47	0.81	1.93	0.25	1.68
Mtn	19.56	4.21	2.26	0.61	0.25	0.72	0.68	1.94	0.15	1.79
Pacific	20.21	3.31	1.92	0.48	0.40	0.55	0.50	1.38	0.16	1.22
HS REGION										
East	19.55	3.34	1.49	0.46	0.13	0.56	0.33	1.86	0.26	1.60
North	19.42	4.23	2.01	0.47	0.20	0.60	0.74	2.22	0.34	1.88
South	19.22	3.85	1.91	0.60	0.21	0.45	0.65	1.94	0.27	1.66
West	20.03	3.57	2.02	0.51	0.36	0.60	0.55	1.54	0.16	1.39

Table 3— Mean Number of Carnegie Units Earned in Vocational Education,
By Type of Course and Selected Student Characteristics — Continued

	Total High School	Total Voc. Ed.	Total Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Homs.	Total Occ. Spec.	General Intro.	Specific Intro./ Adv.
HS URBANICITY										
Urban	17.52	3.21	1.56	0.44	0.21	0.45	0.46	1.65	0.22	1.43
Suburb	20.31	3.69	1.81	0.50	0.22	0.55	0.54	1.87	0.25	1.63
Rural	19.60	4.37	2.15	0.61	0.20	0.59	0.76	2.22	0.34	1.88
HS TYPE										
Public	19.21	3.97	1.95	0.53	0.23	0.58	0.62	2.02	0.28	1.74
Catholic	23.42	2.24	1.06	0.50	0.05	0.17	0.34	1.16	0.19	0.98
Oth priv	20.10	1.69	0.90	0.40	0.09	0.18	0.23	0.80	0.15	0.65
HS PROGRAM										
General	17.58	3.66	2.00	0.48	0.24	0.59	0.69	1.66	0.26	1.40
Academic	21.50	2.74	1.42	0.50	0.12	0.38	0.41	1.33	0.20	1.13
Voc/tech	18.64	5.41	2.36	0.59	0.31	0.72	0.74	3.05	0.39	2.66
HS GRADE AVG										
A	23.12	2.63	1.33	0.53	0.10	0.25	0.45	1.30	0.17	1.13
A to B	22.51	3.11	1.48	0.60	0.12	0.30	0.47	1.62	0.21	1.41
B	21.50	3.64	1.77	0.58	0.18	0.45	0.57	1.86	0.26	1.60
B to C	20.48	4.30	2.08	0.56	0.28	0.56	0.68	2.22	0.30	1.92
C	18.07	4.21	2.08	0.50	0.25	0.70	0.63	2.13	0.31	1.82
C to D	14.21	3.27	1.67	0.32	0.16	0.68	0.51	1.59	0.25	1.34
D	8.06	1.69	0.91	0.23	0.11	0.27	0.29	0.79	0.14	0.64
ABILITY QUARTILE										
Low	16.71	4.30	2.18	0.47	0.34	0.57	0.80	2.11	0.27	1.84
25 to 49%	19.21	4.61	2.20	0.60	0.24	0.66	0.70	2.41	0.37	2.04
50 to 75%	20.43	3.97	1.94	0.60	0.20	0.56	0.58	2.03	0.27	1.76
High	21.89	2.39	1.16	0.43	0.07	0.36	0.30	1.23	0.16	1.05
HS HOMEWORK										
Lt 1 hr/wk	17.23	4.40	2.14	0.40	0.33	0.88	0.52	2.27	0.28	1.99
1-5 hr/wk	20.36	4.14	2.02	0.58	0.23	0.55	0.67	2.12	0.30	1.82
5+ hr/wk	20.79	2.67	1.33	0.50	0.10	0.28	0.45	1.34	0.21	1.13
HS DIPLOMA										
Regular hs dip	21.23	4.13	1.99	0.57	0.23	0.56	0.63	2.14	0.30	1.85
Dip return	11.24	2.11	1.27	0.30	0.14	0.49	0.33	0.85	0.15	0.70
No dip return	10.59	2.27	1.43	0.24	0.15	0.59	0.46	0.84	0.16	0.68
No return	9.88	1.93	1.09	0.23	0.15	0.37	0.34	0.84	0.13	0.70
HAS CHILDREN										
None	20.02	3.81	1.85	0.52	0.20	0.56	0.56	1.97	0.27	1.70
Some	15.59	3.65	1.97	0.50	0.28	0.38	0.81	1.69	0.27	1.42
OCT82 PSE STATUS										
Pt pri4	21.18	2.75	1.44	0.44	0.34	0.24	0.42	1.31	0.22	1.10
Pt pub4	21.47	3.63	1.77	0.64	0.16	0.31	0.66	1.86	0.25	1.60
Pt pub2	20.67	4.10	1.90	0.64	0.19	0.44	0.63	2.20	0.31	1.88
Pt oth	18.45	3.36	1.73	0.36	0.43	0.40	0.54	1.63	0.09	1.54
Ft pri4	22.43	2.11	1.08	0.41	0.11	0.25	0.31	1.03	0.15	0.87
Ft pub4	22.18	2.86	1.38	0.53	0.09	0.32	0.44	1.48	0.22	1.25
Ft pub2	21.51	3.91	1.90	0.61	0.16	0.52	0.59	2.01	0.26	1.75
Ft oth	21.11	4.16	2.11	0.64	0.14	0.57	0.75	2.05	0.27	1.78
Not studt	17.58	4.27	2.10	0.49	0.28	0.67	0.66	2.18	0.30	1.87

Table 3— Mean Number of Carnegie Units Earned in Vocational Education,
By Type of Course and Selected Student Characteristics — Continued

	Total High School	Total Voc. Ed.	Total Non-Occ. Voc. Ed.	Basic Skills	Career Explor.	Indust. Arts	Cons. Home.	Total Occ. Spec.	General Intro.	Specific Intro./ Adv.
FEB83 PSE STATUS										
Pt pri4	20.70	2.51	1.21	0.40	0.14	0.28	0.38	1.30	0.19	1.11
Pt pub4	21.06	3.51	1.81	0.68	0.15	0.32	0.66	1.70	0.26	1.44
Pt pub2	20.56	4.02	1.90	0.67	0.19	0.46	0.58	2.12	0.30	1.82
Pt oth	20.94	4.05	2.00	0.49	0.08	0.60	0.86	2.06	0.26	1.79
Ft pri4	22.41	2.09	1.05	0.41	0.09	0.26	0.29	1.04	0.16	0.88
Ft pub4	22.14	2.80	1.38	0.52	0.11	0.32	0.43	1.41	0.22	1.20
Ft pub2	21.73	3.93	1.91	0.61	0.17	0.54	0.58	2.03	0.28	1.75
Ft oth	20.97	4.05	2.00	0.65	0.12	0.48	0.75	2.05	0.28	1.77
Not studt	17.61	4.30	2.10	0.49	0.28	0.67	0.66	2.19	0.30	1.89
OCT82 JOB STATUS										
Ft job	18.87	4.26	2.02	0.47	0.26	0.75	0.54	2.24	0.28	1.95
Pt job	20.76	3.72	1.84	0.58	0.19	0.48	0.59	1.88	0.26	1.62
Unemployed	17.16	4.21	1.99	0.57	0.25	0.46	0.70	2.23	0.35	1.88
Not labor force	19.79	3.39	1.72	0.51	0.18	0.41	0.61	1.68	0.25	1.42
FEB83 JOB STATUS										
Ft job	18.98	4.35	2.03	0.48	0.28	0.73	0.54	2.32	0.30	2.02
Pt job	20.90	3.69	1.83	0.58	0.17	0.49	0.60	1.85	0.25	1.60
Unemployed	16.96	4.17	2.09	0.57	0.33	0.49	0.70	2.08	0.28	1.80
Not labor force	19.68	3.29	1.67	0.51	0.16	0.40	0.60	1.61	0.26	1.36

CLASSIFICATION OF VOCATIONAL EDUCATION COURSES

A. NOT OCCUPATIONALLY SPECIFIC

1. Basic Skills

Business English I and II (07.0411, 07.0412)
Business Mathematics I and II (07.0171, 07.0172)
Business Economics (06.0511, 06.0500)
Typewriting I (07.0711)

2. Career Exploration

Junior Achievement (08.0321)
Career Exploration (32.0103)
Work Experience (32.0104)
Work Experience, Advanced (32.0105)
Coop Ed. I and II (32.0106, 32.0107)

3. Industrial Arts

Industrial Arts (21.0101 to 21.0120, 21.0126, 21.0100)
Architecture (04.0211 to 04.0221, 04.0200)
Communication Technologies (10.0111, 10.0121)
Cosmetology I (12.0411)
Home Maintenance and Repair (46.0441)
Auto Mechanics I (47.0621)
Consumer Auto (47.0651)
Mechanical Drawing I (48.0111)*
Leatherwork I (48.0311)*
Metal I (48.0511)*
Woodworking I (48.0711)*
Crafts — Printmaking (50.0291)
Fine Arts — Silk Screen (50.0721)

4. Consumer and Homemaking

Consumer and Homemaking Econ. (20.0111 to 20.0192, 20.0100)

B. OCCUPATIONALLY SPECIFIC

1. General Introductory

Agribusiness, Intro. (01.0111)
Agricultural Production, General (01.0311)
Agricultural Sciences, General (02.0111)
Business Introduction (06.0111)
Business Law (06.0121)
Business, Independent Study (06.0131, 06.0100)
Banking and Finance (06.0311, 06.0300)
Computers in Business (07.0311)

Distributive Ed. I (08.0711)
Health Occupations I (17.0511)

2. Specific Introductory or Advanced

Agriculture

Agric. Business and Mgt. (01.0121 to 01.0181, 01.0100)
Agric. Mechanics (01.0211 to 01.0271, 01.0200)
Agric. Production (01.0312 to 01.0331, 01.0300)
Agric. Services and Supplies (01.0511 to 01.0521, 01.0500)
Horticulture (01.0611 to 01.0681, 01.0600)
Agric. Sciences (02.0121 to 02.0124, 02.0100)
Animal Sciences (02.0211 to 02.0281, 02.0200)
Plant Sciences (02.0411 to 02.0423, 02.0400)
Soil Sciences (02.0511 to 02.0521, 02.0500)
Conservation and Regulation (03.0211, 03.0200)
Fishing and Fisheries (03.0311, 03.0300)
Forestry and Rel. Sciences (03.0511, 03.0512, 03.0500)
Wildlife Mgt. (03.0611, 03.0621, 03.0600)

Business

Bus. Ed., Cooperative (06.0141)
Bus. Admin. and Mgt. (06.0411, 06.0400)
Small Bus. Mgt. (06.1811, 06.0800)
Acct., Bookkeeping (07.0111 to 07.0162, 07.0100)
Banking and Rel. Financial (07.0211 to 07.0231, 07.0200)
Bus. Data Processing (07.0321 to 07.0361, 07.0300)
Secretarial and Related (07.0611 to 07.0671, 07.0600)
Typing, Gen. Off. (07.0712, 07.0713, 07.0731 to 07.0742, 07.0700)

Marketing and Distribution

Institutional Mgt. (06.0711, 06.0712, 06.0700)
Insurance and Risk Mgt. (06.0811, 06.0800)
Marketing Mgt. and Research (06.1411, 06.1400)
Real Estate (06.1711, 06.1700)
Small Bus. Mgt. and Ownership (06.1811, 06.1800)
Apparel and Access. Mkting. (08.0111, 08.0121, 08.0100)
Entrepreneurship (08.0311)
Floristry, Farm and Garden Mkting. (08.0511, 08.0500)
General Mkting. (08.0712 to 08.0771, 08.0700)
Transp. and Travel Mkting. (08.1111, 08.1100)
Vehicle and Petroleum Mkting. (08.1211, 08.1221, 08.1200)
Advertising (09.0211, 09.0200)

Health

Dental Services (17.0111 to 17.0132, 17.0100)
Medical Laboratory Technologies (17.0311, 17.0312, 17.0300)
Mental Health/Human Services (17.0411, 17.0421, 17.0400)
Misc. Health (17.0521 to 17.0591, 17.0500)
Nursing-Related Services (17.0621 to 17.0651, 17.0600)

Occupational Home Economics

Interior Design (04.0511)
Child Care and Guidance (20.0211 to 20.0251, 20.0200)

Clothing, Apparel, Textiles (20.0311 to 20.0391, 20.0300)
Food Prod., Mgt., and Services (20.0411 to 20.0481, 20.0400)
Home Furnishing and Equip. (20.0511 to 20.0571 20.0500)
Institutional, Home Mgt. (20.0611 to 20.0661, 20.0600)

Trade and Industry

Communication Technologies — Photog. (10.0131, 10.0132)
Dry Cleaning and Laundering (12.0111, 12.0100)
Personal Services (12.0412 to 12.0431, 12.0400)
Civil Technologies (15.0211, 15.0200)
Electrical and Electronic Tech. (15.0311 to 15.0332, 15.0300)
Electromechanical (15.0411, 15.0421, 15.0400)
Environmental Control Tech. (15.0511, 15.0500)
Industrial Production Tech. (15.0611, 15.0631, 15.0600)
Quality Control and Safety (15.0711, 15.0700)
Mining and Petroleum Tech. (15.0911, 15.0921, 15.0900)
Ind. Arts Coop. Train. & Exp. (21.0110 to 21.0112)
Ind. Arts — Mach. Shop (21.0121 to 21.0125)
Masonry (46.0111 to 46.0121, 46.0100)
Carpentry (46.0211 to 46.0213, 46.0200)
Electrical Install. (46.0311 to 46.0321, 46.0300)
Misc. Construct. Trades (46.0411 to 46.0431, 46.0400)
Plumbing (46.0511 to 46.0512, 46.0500)
Constr. Trades, Other (46.9900)
Electrical and Electronics Repair (47.0111 to 47.0171, 47.0100)
Heating, Air Cond., Refrig. (47.0211 to 47.0212, 47.0200)
Ind. Equip. Maint. and Repair (47.0311 to 47.0321, 47.0300)
Misc. Mech. and Repair (47.0411 to 47.0431, 47.0400)
Stationary Energy Sources (47.0511 to 47.0521, 47.0500)
Vehicle and Mobile Equip. (47.0611, 47.0612, 47.0622 to
47.0642, 47.0661 to 47.0692, 47.0600)
Precision Production (48.0112 to 48.0152, 48.0100)
Graphic and Printing Commun. (48.0211 to 48.0251, 48.0200)
Leatherworking and Upholstering (48.0312 to 48.0331, 48.0300)
Precision Food Production (48.0411 48.0400)
Precision Metal Work (48.0512 to 48.0552, 48.0500)
Precision Work, Assorted Materials (48.0611, 48.0612, 48.0600)
Woodworking (48.0712 to 48.0732, 48.0700)
Vehicle and Equip. Operation (49.0211, 49.0200)
Water Transportation (49.0311 to 49.0321, 49.0300)

Technical

Communications Tech. (10.0141 to 10.0181, 10.0100)
Computer Programming (11.0211 to 11.0251, 11.0200)*
Data Processing (11.0311 to 11.0313, 11.0300)
Industrial Production Tech. — Chemical (15.0621)
Medical Lab. Tech. — Chemical (17.0321, 17.0322, 17.0300)

Equity and Vocational Education

Carol Gibson

President

Gibson & Associates

The purpose of this paper is threefold: to examine the economic condition of urban groups for whom equity in vocational education has not been realized; to discuss the question of equity in relation to vocational education; and, finally, to suggest certain specific strategies that can be employed to ensure a more equitable distribution of high-demand labor market skills to all students.

It appears that vocational education today stands on the brink of a historical opportunity. This period is reminiscent of a previous era -- 1900-1917 -- when the Smith-Hughes Act brought about the dramatic changes still a part of today's vocational education legislation.

Reading the testimony which led to the 1976 amendments and the ensuing debates, one can almost hear echoes of David Snedden and Charles Prosser. Snedden, the purist, was interested in organization and delivery; Prosser, on the other hand, was concerned with education's responsibility to promote social justice. Both, however, believed that the wage earner in a democratic, industrial society had a right to job preparation and that the government had the responsibility to make sure that such preparation was provided.

Unfortunately, education in general, as delivered by public institutions at all levels, is in deep, deep trouble. The decline in the quality of public vocational education is especially detrimental in an era where certain types of jobs are disappearing and the competition for those that remain is increasingly based upon the mastery of technical skills. Furthermore, many of the newer entrants are and will continue to be solely dependent on these beleaguered public education institutions to acquire and develop their marketable skills. If these institutions fail to meet this challenge, a valuable human resource will be wasted.

Vocational education as a sub-system, whether in public or private schools or at secondary or post-secondary institutions, is also clearly undergoing a period of long overdue self-examination. This reassessment began with the discussions that preceded the reauthorization legislation in 1963 and 1968, which was finally crystalized in the 1976 act. Today the debate continues unabated and will no doubt rekindle controversy throughout the remainder of the 1980s, with the ultimate resolution eluding us until the early 1990s.

In this context, I think that the equity versus social responsibility controversy really means, "Do non-Voc Ed types expect too much of us" or "Is there any way for the Voc Ed community to continue to survive functioning in a vacuum, doing what is comfortable, immediately rewarding and/or definitely measurable?" The answer to the question in either form is a resounding -NO!

Over the past few years, several national studies of the problems of unemployment have received considerable publicity; and thus we are all familiar with the fact that the group with the most severe problems is today's youth; and that within that global grouping, minority youth, especially females, have the most severe problems. Logically then, if we seek to improve the state of our economy, we must simultaneously understand that this effort requires the development of all human resources and the institutions which help in this important endeavor. Moreover, what happens occupationally to a nation's youth will determine the economic future. A nation's young people are perhaps the most important national and capital resource. It is then obvious that vocational education has a central and mediating role to play in providing technical expertise to this underserved group so that equity or market justice can prevail. However, one must first examine the ability of the labor market to respond to equity.

Labor Market Problems Confronting Youth, Minorities, and Women

We must critically examine the proposed solutions in the context of what the data tell us about existing inequities. Here Dr. Walter Stafford's research in this area must be acknowledged. Dr. Stafford is a labor market analyst, currently with the Community Service Society in New York City. His research efforts reflect a special interest in occupational mobility and occupational forecasting. Dr. Stafford has found that the employment-population ratios and labor force participation rates of young black men have fallen consistently and substantially since 1955. Several analysts -- Freeman (1980), for one -- have noted that it is the decline in labor force activity of non-white youth that constitutes the core of youth joblessness.

Ironically, the labor force participation and employment rates of minority youth have declined at a time when their educational attainment has been increasing. Overall, the unemployment problems of minority youth can be best explained by structural problems and discrimination. That educational attainment has not resulted in employment parity for black youth is an example of structural problem. This raises a disturbing set of questions about the relationship between motivation, aspiration level, schooling, and occupational attainments and rewards. Is it that labor market justice has just eluded this group or is it that they have not been exposed to those "high-demand" skills through which educational attainment is translated into employment opportunity?

In 1980, the clear majority of unemployed black youth (ages 16 to 24) had completed high school (59 percent). Fifteen percent had gone on to college. While the educational levels of black and white youth are no longer radically different, their employment opportunities vary markedly. It is important to note that educational attainment has not assisted younger blacks in the manner that would reasonably be expected. In 1983 for blacks, aged 16 to 24, with four years of high school, the unemployment rate was 24 percent compared to 10 percent for whites. Even those blacks with one to three years of college had higher unemployment rates than white high school graduates (22 percent compared to 10 percent). Indeed, it is only among those with four or more years of college that the unemployment rates of blacks and whites became similar. Clearly, the mere attainment of a high school diploma has only partially impacted unemployment rates for black youth, or the types of jobs they receive.

Minorities and women will make up an increasingly larger percentage of school enrollments and of the work force. The minority population, including Hispanics, in the 16-24 age group will increase from 18.6 percent in 1977 to 22.1 percent in 1995. Minorities are expected to increase to 30 percent of the labor force by the late 1980s. The participation rate for females in the labor force today is about 50 percent. It is expected to be over 55 percent by 1990 and nearly 58 percent by 1995.

These figures indicate that there will be greater demand in the late '80s and '90s for high-quality, up-to-date vocational training for all segments of the population, with greater participation than ever before by minorities and women. There will be a concomitant emphasis on post-secondary and adult vocational programs to help these groups develop the requisite skills. The delivery system which successfully delivers quality services in response to this demand will get the funds.

The economics of equity have special relevance to vocational education. Although on an extremely limited scale, some blacks, Hispanics, and women have successfully improved their economic position and earnings because of vocational education. Many members of minority groups have been able to enter primary jobs associated with good wages through vocational training. Blacks and Hispanics, however, have been disproportionately represented in certain occupational education programs. In 1979, white enrollment in occupational education programs comprised 67 percent of the total. Blacks were overrepresented in home economic and business office occupations, and in trade and industry. Both Hispanics and blacks were underrepresented in agribusiness, marketing, and technical occupations. In other words, blacks and Hispanics have been less apt to be found in vocational education programs for which there is high labor market

demand and better financial reward. Indeed, they are largely found clustered in the lower-paying vocational trades. With respect to adult education, males are less apt to participate in vocational education than females; and 55 percent of adult vocational enrollments were women. Both blacks and Hispanic adults are underrepresented in these educational programs.

These statistics about what happens to minority youngsters in vocational education schools became very real as I read the March 6, 1986 edition of the New York Times and saw an article with the headline: "A Troubled High School in Brooklyn Will Close." The story was about a vocational education school, Eli Whitney High School, which offered courses "in trades such as dressmaking, appliance repair, business education and cosmetology." In commenting about the reasons why the school was closing, a guidance counselor who had been at the school for the past 25 years explained: "For years, Whitney was one of the top vocational schools. Then it lost its screening tests, and we ended up getting a lot other schools' rejects." Clearly, the inappropriateness of the curricular offerings in relation to labor market needs or the employability potential of today's inner-city students did not enter into this counselor's thinking.

Equity in vocational education means the development of an equitable distribution of vocational education resources and services to include more minorities and women. Given the dependence of economic development on the quality and quantity of our human capital, equity must be achieved. The concept of equity must permeate all facets of the vocational education system and not be limited to administration or staffing.

Accordingly, it is my belief that vocational education's rightful role should be helping to ensure market justice by providing the skills needed to all seekers. We should not expect that vocational education be the panacea for long-standing racial and social injustice; rather, what is needed is an acknowledgement that these practices did in the past preclude the achievement of educational equity, and that we need henceforth to provide opportunities for all.

While economic strength and social justice are related, vocational education should not be measured against social outcomes when assessing its achievements. Specifically, the primary justification for vocational education's role in the secondary and post-secondary curricula is that it improves the pool of human resources skills and the economic health of the community by preparing people for the initial entry level and/or skilled employment. Thus the outcome measure is marketable skills. A program should measure its success by how quickly and efficiently an individual progresses from learning or upgrading occupational skills to long-range career mobility planning. When the individual is ready for a job, the responsibility of placement should rest on the labor market -- not on the program.

Labor Market Problems

Discrimination in the labor force is a reality and must be examined as we try to resolve questions about equity in vocational education. Unfortunately, vocational education in practice remains today racist and sexist. This is not a commentary on the intent of policies and practices or on the attitudes of planners, administrators, and teachers; rather it is a testament to the outcomes -- fewer opportunities and/or lower pay. Furthermore, as long as its funding and therefore its delivery of services is tied to placements, vocational education will remain a captive of, as well as a reflection of, the racism and sexism which exist in the labor market.

While there is no doubt that discrimination persists, the manner in which it operates with other problems to exclude minorities from better jobs is not clear. For example, black teenage joblessness is thought to be affected by a variety of factors. However, several factors that are commonly assumed to be reasons for high rates of black youth joblessness are upon closer examination not statistically significant. Residence in central cities away from suburban jobs has not been shown to be a major factor affecting the high joblessness of black youth (Osterman, 1979); the minimum wage has had a minimal effect on the reasons for black youth joblessness (Hill, 1979) and the argument that high joblessness has been due to the high supply or surplus of black youth in a market with declining jobs is suspect. In addition, data show that the job search

methods of black and white males are not widely different, with the exception of the reliance by blacks on state employment agencies. Thus, the methods of seeking work are not a major factor in the ability of black youth to obtain jobs (Stafford, 1980).

Given the inadequacy of these explanations to account for the persistence of black youth joblessness, this problem must be viewed carefully by age, sex, and geographic region. Although some writers have attempted to use the "underground economy," as an alternative explanation for the low rate of labor market participation by black males, this does not adequately explain the wide disparity. The persistence of employer discrimination exacerbated by depressed labor markets does not signal a promising trend for black youth employment. Thus, alternatives must be found to counterbalance the inequities.

In this regard, it should be noted that a vocational education delivery system concerned about equity would be an active participant in the search for alternatives to career and skills development for jobs in the primary labor market. One way to offset employer discrimination is to build the human capital quotient of black youth. There is little room in the American economy today for unskilled labor. Any high school dropout, and many college graduates can attest to that fact.

Problems With Transition

For more than a decade there has been a major concern with the transition of youth from the family and school to a productive adulthood. This concern was heightened during the 1970s and continues to be a major concern of the 1980s as it is increasingly apparent that many youth face an uncertain future with few chances for long-term job mobility.

The 1970s was a period of growing concern for black youth which was generally reflected in three ways. First, there was and continues to be a concern that the employment prospects of black youth, especially in an era of scarcity, are so bleak that many will permanently drop out of the labor market. The governmental response to this continuing problem has been a variety of job and career development programs, often combined with research. Unfortunately, after more than a decade of research and program efforts, there is general consensus that little had been learned during this era which could be used to help alleviate youth joblessness. Even more foreboding is the fact that in 1986 the jobless rate among black youth now exceeds 42.5 percent (BSL, March, 1986).

A second concern has been broadly identified with the fear that high unemployment, especially among black males, is a dominant source of crime and delinquency which has become a major disruptive force in society. The third concern has focused on the assumption that the traditional institutions (family, school, churches, etc.) were no longer able to provide the support needed to assist youth during the transition stages. Compensatory and intervention programs in public schools have provided the major programmatic thrust for the assumed deficits in traditional institutions. However, the degree to which the different compensatory and intervention strategies achieved their goals remains the subject of considerable debate. A significant problem has been that the intervention strategies were fragmented, and although we have examined strategies for out-of-school youth, the career awareness counseling and skills training of in-school youth have been largely ignored.

Retaining black youth in schools and placing greater emphasis on basic and employability skills is emerging as a clear alternative to acquisition of skills for secondary labor market jobs, which were often marginal and offered few learning experiences. A radical perspective is required -- one that recognizes that vocational education has historically failed to bolster the skills of many youth who found marginal jobs in the secondary labor market (i.e., jobs which tend to be low-paying with poor working conditions and little chance of advancement). We -- vocational educators -- now have little choice but to accept the role of assisting in the maturation of youth who have almost no chance of finding even the most menial of jobs. Secondly, vocational education schools and related community and business organizations should help youth by fostering a greater

knowledge of career options and career mobility strategies. Most jobs in the secondary labor market never did provide youth and particularly black youth with career information or techniques to progress within the organization.

Responses In Three Communities

There is in operation at this time a tri-partnership program developed with funding from the Edna McConnell Clark Foundation, by the National Urban League in three of its affiliate cities. The three cities were selected as project sites because of a history of good working relationships between the local CBO (the Urban League), the school system, and the business community. The three communities had also recognized that changes in the world's economy were having long-term impacts on their local economies, such that forecasts for future labor market needs would be definitively changed. The status of the three communities -- Portland, Pittsburgh, and Houston -- is described.

Oregon's unemployment rate overall remains at 10.6 percent, compared with the national rate of 8.2 percent. The unemployment rate for youth (ages 16-19) in the Portland area is 27.4 percent, and the minority youth unemployment rate is 66.4 percent. The primary component of Portland's economic growth has been the diversification of the area's economy. Traditionally based upon wood and pulp products, transportation, and retail trade, the economy has rapidly been diversifying through expansion in the areas of financial services and high technology manufacturing. These trends are expected to continue, with employment in the financial services industry projected to grow 11 percent faster than overall employment. Portland's growth as an office center and corporate headquarters has opened up opportunities for persons with state-of-the-art financial management skills and knowledge. This need spans the complete spectrum of Portland-based businesses, with particular emphasis on the banking, accounting, and insurance industry.

The Pittsburgh area has been one of the regions in the country hardest hit by the current U.S. recession. Unemployment peaked at 16.5 percent in March 1983, and Pittsburgh is now entering a slow recovery period with unemployment at 12.6 percent. Non-whites have been particularly affected. While the city's 1982 annual average of unemployment for whites was 9.6 percent, it was 35.7 percent for non-whites. According to the Pittsburgh Chamber of Commerce, the current and future employment prospects, especially for black teens who lack technological skills are bleak. The current unemployment rate for black teens is a staggering 42 percent.

The area, however, is experiencing an increase in employment in banking and service sector businesses. According to the Pennsylvania Department of Labor and Industry's ES202 file, in the Pittsburgh metropolitan area (MSA), banking jobs increased from 15,700 in 1980 to 17,200 in 1983; and service sector jobs increased from 191,600 to 200,000 in 1983. The Department's projections for the Pittsburgh MSA for the period 1980-1990 indicate that there will be 14,300 new jobs in banking (an 18.1 percent net increase) and 284,000 new jobs in service industries, a 29.3 percent increase.

According to a paper presented at the Hogg Foundation's Robert L. Sutherland Seminar in July 1982, there are approximately 36,500 school dropouts aged 16 to 20 in Houston. The "Statistical Data on Drop-Outs" report prepared by the District's Report and Data Analysis Committee (April 1983), revealed that students ages 16 to 18 accounted for 3,128 of HISD's dropouts in 1981-82. Over 25 percent of these students were sophomores and more than 80 percent were minority students.

The Houston economy is dependent on the petrochemical industry and is reinforced by diversifications in the financial and service sector, insurance companies, real estate, and wholesale/retail industries. High technology (spurred by NASA at the Johnson Space Center and Texas Medical Center) is emerging as a major contributor to the Houston economy, and a means of

decreasing their dependency on the petrochemical industry. The microprocessor training program speaks to the needs of this growing industry in Houston.

Based on a year's study of an in-depth analysis of the preceeding data, in Portland a "Financial Service Technology Academy" was planned; in Houston a "Microprocessor-Based Equipment Technology Academy" was planned; the "Pittsburgh Business and Finance Academy" was planned for the Westinghouse High School.

While each community was urged to develop the generic concept to fit its own needs, a description of one program will be sufficient. The Westinghouse High School in Pittsburgh serves the greatest proportion of the district's "at-risk" students. Attendance statistics for the PPS' high school students averaged 85.2 percent during the 1982-1983 school year. The Westinghouse figure for the same time period was 80.8 percent. During the same school year, Westinghouse had the highest dropout rate in the system. The present total enrollment at Westinghouse is 1,135 students; of these approximately 80 percent receive free lunch and about 50 percent of the students' families receive aid to dependent children.

The core teachers assigned to the Academy have increased responsibilities compared with regular high school teachers. Unique to the Academy program is the work of the lead teacher in identifying needs for curriculum and staff development, participation in staff and curriculum development activities, providing assistance in the student career development process, interfacing with the business sector partnership in the educational and work experience program, and team-working with other Academy teachers.

Teachers are paid for this extra planning time as an incentive to participate. The lead teacher plans a staff development program to provide for the selection of relevant topics to assist teachers in more successfully meeting the Academy's goals and objectives through skill development activities.

Ninth- and tenth-grade disadvantaged and underachieving students, primarily black and minority, are selected for the program.

- To establish and maintain a student body of "at-risk" disadvantaged students.
- To establish and maintain a special curriculum design for grades 10-12 related to business and finance entry-level generalist job positions.
- To encourage a pattern whereby the private sector becomes involved in the public schools and whereby the public schools seek greater input from the private sector in curriculum development to effect student job readiness.
- To increase the probability that the students enrolled in the program will remain in high school, excel academically, graduate, be prepared for the work world, and secure full-time employment.

The program includes the use of aides, tutors, and special help classes. Staff from participating area businesses will be involved as mentors to motivate students with respect to career decision-making, workplace expectations, and the application of business/finance course work to job skills and positions.

The work experience component began in January 1985 on a part-time basis of 12-15 hours per week and continued in the summer with the hours increased to 20-25 hours per week. Thereafter, these part-time school year and summer jobs are planned to continue as part of the program.

Curriculum/Faculty

Three curricula will have a high technology orientation, which will build transferable technological literacy skills in the electronic aspects of modern banking and office procedures. Career exploration activities are also built into the Academy through the participation of mentors or instructors from banks and service businesses in the business and finance education

program. Further career exploration is led by school system teachers as it applies to the content of the Academy's business and finance course-work.

Academy students will be "block-rostered" or scheduled to take all their classes together with the exception of physical education and general high school academic subjects. This will enhance the Academy's teaching team's ability to monitor students comprehensively, to foster the group identity and spirit of the Academy, and to maximize the intergration of instructors and mentors from area banks and businesses into the total Academy program.

Classes will be taught in sections of 20 students. This class size will assist teachers in providing the most individualized instruction possible and with the student monitoring/evaluation process.

The Academy's curriculum contains the academic coursework necessary for students to meet skill development requirements for high school graduation. These requirements are: English for the 10th, 11th, and 12th grades; math for the 10th and 11th grades; science for the 10th and 11th grades; social studies for the 10th and 11th grades. Academic teachers for the above subjects areas will be allowed time to teach the students in sections of 20. The Academy's teachers will integrate academic course work with business and finance.

The Academy's lead teacher and core academic and business education teachers meet for two hours a week to discuss student progress and problems, during common planning time. This action helps to build a team approach to the day-to-day student evaluation process, which will enhance decision-making with regard to the use of school system's existing counseling services.

The Pittsburgh Public Schools (PPS) agreed to provide a lead teacher half-time for the 1984-1985 school year and full-time for the 1985-1986 school year and for Academy school years thereafter. The school system also agreed to assign classroom laboratory and physical education space and to assign teachers for the Academy's academic and special program courses.

The Westinghouse High School principal supervises the Academy's teachers and clerical support was made available from Westinghouse. The school system also provided the Academy with basic school supplies, equipment (a word-processing lab and one microcomputer), text/resource books, technical assistance through administrative staff, and representatives for the ad-hoc committee.

A full-time project director housed in the Urban League of Pittsburgh functions as liaison with the business community and the school system. The director ensures that the Urban League's support services are made available to the students and their families and that the full range of school-based services are available to the participants.

The Pittsburgh Business and Finance Academy functions as a "School-within-a-School" with an ad-hoc committee to assist school staff with problems and policy. There are nine seats on the committee. One seat is filled by a representative from the Pittsburgh Private Industrial Council, three by appropriate upper-level management staff from Pittsburgh banks, three seats by the PPS administrative personnel, one by the Westinghouse High School principal, and one by the chief executive officer of the Urban League of Pittsburgh.

The consortium of private-sector businesses is committed to supporting the program in cooperation with the PPS as Clark Foundation funds are decreased and eventually terminated.

The Allegheny Conference on Community Development is a privately funded, non-profit organization governed by a 35-member executive committee composed primarily of chief executive officers of Pittsburgh-based corporations. The organization has functioned as the corporate community's leading civic agency active in major downtown improvement projects, and, more recently, support for public schools.

The Pittsburgh Public School System provides general administrative support to the Academy. Administrative staff is available to ensure that the Academy is making optimal use of appropriate school system resources. The school system administrators have expressed their commitment to replicating the program in appropriate schools throughout the district.

The Urban League of Pittsburgh serves as the fiscal/coordinating agency for the Academy. In this role, the League manages the Clark Foundation's funds, provides technical assistance to the

educational program, coordinates the initial implementation of the Academy program, and fills a seat on the ad-hoc committee. The League also supports the Academy with its employment search, housing, and higher education counseling services, and serves as liaison for student referrals to appropriate community health and human services support services. The League's director of education, education specialist, and other clerical support staff are involved in these tasks. The full-time project director is the director of education of the Urban League of Pittsburgh.

The overall success of the Academy will be measured by attendance and dropout rates compared to the same rates for Westinghouse, and the measure of overall success that will be used is the percentage of students who have successfully completed the program and are either employed after graduation or have entered higher education.

The Edna McConnell Clark Foundation will have the chief responsibility for establishing a standardized evaluation system, and consultants from the Clark Foundation will be provided access to all information, materials, and/or personnel necessary for them to complete their evaluation.

A Southern Model

There is a similar innovative program now operating in Greenville, South Carolina. The collaborative efforts between the Greenville Urban League, the school district and the business community is known as "The Partnership." Its purpose is to help students make a smooth transition from the classroom to employment, college or technical training schools. The program began in September 1985 with 33 tenth and eleventh grade students and is still operating. Students are provided enrichment experiences during the school year through field trips, lectures, and on-site job training activities, as well as academic assistance.

In addition to increasing the skills and aspirations of students, the project seeks to capitalize on the Greenville School district's career education program, and to continue the collaborative effort between the Greenville Urban League, the school district of Greenville County and the business community. This approach offers a number of advantages listed in the "general objective."

There are three key actors in the development and implementation of the Partnership -- the Greenville County school district, the business community, and the Greenville Urban League. Each actor will have specific responsibilities on behalf of the target population: the student.

The school district selects teachers, program administrators, counselors, and students who participate based upon a set of criteria developed jointly by representatives of each of the major actors. The school district also provides classroom space and instructional materials.

The business community provides financial assistance, identifies externships for teachers, and assists in developing curriculum, field sites, and job placements for students.

The Greenville Urban League assists in the design of the training for teachers, program administrators, and counselors. In addition, the League provides office space, professional staff, instructional materials, and other in-kind support. The program curriculum as well as other major project decisions are made in collaboration with representatives from the school district and the business community. A steering committee is formed to direct and monitor the project.

The general objectives of the Partnership are as follows:

- To allow the business sector the opportunity to provide input into the preparation of potential employees.
- To allow the school system the opportunity to utilize the vast resources of the business community.
- To build a closer relationship between the education and business communities.
- To maximize the potential of low achievers by strengthening academic and employability skills.
- To increase the alternatives for minority and disadvantaged youth.

Activities take place during the entire calendar year. Participating staff from the school district of Greenville County are selected from three comprehensive secondary schools whose student bodies are primarily from disadvantaged groups.

First, the program offers formal training and staff development activities to a minimum of seven from each participating school, who may be principals, vice-principals, teachers, counselors, or program staff. This training focuses on two areas: career education, and effective methods of instruction combining career education concepts with traditional academics. The curriculum emphasis aids teachers in designing academic material which integrates employer interest and occupational issues into traditional subject areas. The instructional emphasis seeks to increase the teachers' effectiveness in teaching the application of the academic subject in the work experience.

Second, teachers who participate in this staff training are placed in "externships" with Greenville-based employers. These externships last four weeks and occur immediately following an initial five-day training period. After the externships, teachers participate in a second five-day training session. The principal guiding the externships placements locates those positions that expose the teachers to the knowledge and skills that employers expect -- areas such as critical thinking and technology awareness -- so that teachers may integrate these and similar areas into instruction. After completing both the training and externship during the summer, teachers are expected to impart to their students, through their traditional classes, the expectations of employers.

Strategies for Change

In the past and even now, vocational education has been rather unsuccessful in developing equitable programs for the diverse groups it serves. Although minorities and women have made significant gains in vocational education, they are involved to a lesser extent in the planning and administration of vocational education programs. Often minorities and women and the handicapped are largely underrepresented at all upper-level staff positions. Moreover, minorities and women in vocational education administration may frequently experience lower earnings than their white and male counterparts. Women are often relegated to traditional clerical occupations. Thus there is a market injustice within the administrative structure of vocational education.

Discrimination is prevalent in vocational education programs. As we have noted, minorities who successfully complete vocational training may often encounter problems entering the labor market. Females with the same vocational training may experience lower earnings than their male counterparts. Placement rates are likely to be lower for minorities and women than for the other groups. Thus, the rate of return on investment in vocational education may be higher for males and whites than for women and minorities. As a result, funding for vocational education programs should not be tied to placement rates, but the vocational education community ought to become much more aggressive about its pivotal role in providing quality learning to those who need the skills in order to enrich themselves and their community. A vocational education delivery system concerned with equity and responsive to economic development will take a leadership role in ending the double-jeopardy conundrum of discrimination in enrollment practices causing, and being caused by, discrimination in the labor market.

Vocational education has been given a Hobson's choice by its friends and has chosen the easier way out. Yes, there is a need for and a role for equity in vocational education, but it can be achieved only if the system decides to throw down the gauntlet, to be aggressive, to give direction and provide leadership. In the coming decades of economic recovery and economic growth--as in times of high defense production--skill and training will be the cutting edge in determining employability, not race or sex. Vocational education needs to shed the me-too-ism shelter in the placement/funding syndrome and be in the forefront of a new dialogue and strategy.

Some funding strategies:

- Offer voucher alternatives to quasi-governmental career development and centers if the local education agencies (LEAs) continue to be unable and/or unwilling to serve the aforesaid populations.

- Use federal dollars as an incentive to attract state dollars.
- Earmark federal funds exclusively for equity considerations.

- Form vocational education teachers/business community advisory councils for the development of career information programs at the middle school level.
- Take a leadership role in defining more coherently employability skills and reform the secondary school curriculum accordingly.
- Take a leadership role in a national dialogue about which type of delivery is best for which types of students in which types of settings and for which vocational areas.

Conclusions

Today's minority youth, who have at least completed high school may be viewed by many as victims of our public institutions. The data about the number of minority high school graduates who are jobless have not been presented. If we examine high school completion as a factor in motivation and productivity, even allowing for all the other self-evident truth about the true value of today's high school credentials, one can assume that tax dollars were wasted on subject matter with little relevance to the real world of work. Equity considerations do have a role in shaping vocational education, and the needs of new generations of students demand that the vocational education community take an aggressive leadership posture within the elementary and secondary educational establishment. If the vocational education establishment continues to sit complacently on its turf, not much will change; the responsibilities and the turf extend far beyond the school yard and deep into the community and into the future.

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Linking Theory and Practice: Innovation in the Structure of Secondary Education

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A serious examination by the states of the subject of vocational education is long overdue. During the past three years of attention to educational quality this segment of secondary education has been ignored either because it was viewed as non-germane or, more likely, because it was considered such a puzzle that policymakers collectively threw up their hands in frustration.

Let me begin by asking you to accept the fundamental premise that Ray Marshall, Marc Tucker, and others have advanced: that we are concerned with preparing the nation youth for a world of work that is changing in important ways as advances in science and technology and shifts in international trade reshape the U.S. economy; that in this new economy highly skilled labor will be an especially valuable asset as capital and technology can be transported across national borders with increasing facility and therefore are less a source of competitive advantage than has heretofore been the case; and that in such an environment high wage employment opportunities will go to people who are adaptable, who can adjust to change, learn about new technologies, production processes and market opportunities, and advise management on ways to improve productivity.

We have a good sense about what sort of competence such workers must possess. They extend way beyond what have come to be known as the basic skills. Being able to memorize a particular task and repeat it over and over again has little value today, for in most instances such work can be automated or exported to a country where the work force is willing to do such labor for much lower wages. What will be valued will be people who can evaluate options, understand the materials and the people they are working with, analyze the competition and think strategically.

That's the easy part. Things get a bit sticky when we ask the question, what sort of institutions operating what sort of instructional programs promise to offer all the nation's youth an opportunity into this high wage workforce of the future? And, more particularly, where does vocational education fit into the picture?

Let us start with the proposition that at some point in one's education specialization makes sense. While a few generalists are, no doubt, able to make a go of it, most of us entering the labor market are looking for an angle, an edge, maybe some expertise or command of a body of knowledge (however modest) to present to prospective employers. Something that will distinguish us from the crowd. The question is, when is it appropriate to begin to offer such instruction? To, in effect, say to the student - you now have an adequate grasp of a broad range of skills, knowledge and competence and that, if you so choose, beginning to specialize has some merit.

The answer, it seems, has at least two parts. First, it is when a student has a solid grounding in the central disciplines that typically comprise the secondary academic curricula: language, literature, mathematics, science, history and government. That is, that the student not only knows the facts, but truly understands the underlying theories and ideas that bind these bodies of knowledge together and has command of what have come to be called the higher order cognitive skills that allow one to utilize and apply their knowledge and expertise in each of these arenas. Second, the specialization option should not be offered before a student is mature enough to make such a decision; to judge the alternatives that are available, where each might lead and what each might preclude.

The answer then may come at different times for different people. There is not one, absolute, tidy marking point for every student. But many scholars and business people think that specialization should be put off until the secondary academic curriculum has been mastered. This

view was summed up by the National Academy of Sciences' Panel on Secondary School Education for the Changing Workplace which, taking its lead from the business community, said: "the schools' primary responsibility is to provide core competence and that other goals, whatever their merit, must come second." They went on to observe that:

Those who enter the work force after earning a high school diploma need virtually the same competence as those going to college, but [and this is a critical point] have less opportunity or time to acquire them.

In short, the Panel seemed to be saying high school is no place for vocational education.

This notion that we have to choose between vocational and academic coursework maybe a false dichotomy, as Ray Marshall has suggested. But there is a growing acceptance of the view that there comes some moment before which specialization does not make sense, and that this moment just happens to coincide with the conclusion of twelfth grade. This may strike some as hopelessly shortsighted or elitist, but it is a position not taken without some thought and one that is now coming to be the accepted view among business leaders -- witness the recent CED report, "Investing in our Children."

Why has this position gained such a following? To start, the premise of a common core of studies for all students has lots of face validity. You know the arguments. To offer vocational coursework in high school, it is also said, will only cut into this core, producing a set of negative consequences in return for very illusory gains. The gains are seen as illusory because secondary vocational education is viewed as especially narrow in scope, often preparing students for jobs of the moment, if not the jobs of the past. The negatives include limiting the broad preparation that students need to survive in the workplace of the future, prematurely cutting off educational options that should be open to all students and, quite ironically, compromising students' ability to succeed in postsecondary specialty studies by denying them the broad grounding in the core competencies that are seen as the prerequisite for success in further studies.

This downside is seen as potentially most damaging to poor and minority students, who are often funnelled into vocational education courses for reasons both well meaning and not, but who are the students most in need of a solid grounding in the core curriculum if they are to have half a chance of making it into the mainstream of the workforce. These students often start off not only behind the educational eight ball but without the family and community support structures that often prove invaluable to the young in successfully navigating the labor market.

While a high school diploma, a union card, and good work habits were once a ticket to the middle class, this recipe no longer looks so promising. The days of starting in the mail room and working one's way up to middle management and beyond are fast fading as internal labor markets are becoming segmented, with one career path for low level, low wage help and another, with much more promising wage prospects, for positions requiring a postsecondary degree.

There is, of course, another point of view. It suggests that secondary vocational education is to be admired because it provides direct exposure to the workplace, its habits, mores, conventions, and expectations, which is of special value to students who would otherwise have a difficult time acquiring a first job. In the words of the Southern Regional Education Board's Commission for Educational Quality:

Secondary vocational education offers an alternative approach to the development of these skills [here speaking of academic skills], especially for students who grasp material more readily through applications than through abstract thinking.

Sounds good, but it doesn't wear well on close examination. This line of reasoning seems to suggest that academic courses are confined to abstract thinking, with no opportunity for applying theory to real world issues. While that may be the rule in some courses in some localities, it is by no means a universal practice, nor is such practice endorsed as good education. We don't need an

alternative if application of theory is part and parcel of regular academic coursework. To the extent this is not the case it should be made a major objective of school curriculum reform. The melding of theory and practice is also a basic principle of good instruction that should be found in the elementary and middle school curricula, not something reserved for secondary vocational courses.

With respect to the benefits of work experience, again, I would agree, all students including college prep students, benefit from exposure to the workplace. But, do we need to tie such activities to a vocational education course? I don't see the rationale. It seems the school, the business community and local government can get together and work out a whole range of work and community service opportunities without benefit of a vocational education curriculum.

So where is this argument taking us? It is to a "first things first" principle and the notion that vocational education, along with other programs of more specialized or advanced study, should not compromise student progress toward mastery of the core curriculum.

The soft underbelly of this argument is that some 16- and 17-year-olds are bored out of their gourds by the time their junior or senior year rolls around, and often justifiably so. There are, for these and other students at least a couple of plausible solutions worth pursuing before we abandon the common curriculum and the principles behind it.

The first is to infuse high school coursework with lots of opportunities to link theory and practice and to emphasize in-depth study at the expense of an obsession with coverage that all too frequently overcomes our secondary schools. Students appear to become much more engaged in their studies when a particular subject can be fully examined from a host of different perspectives and its application to real issues and problems made and appreciated. By concentrating on moving from what may appear to be the random accumulation of a bunch of disconnected facts to an integrated understanding of a more modest body of knowledge, learning of a much more valuable and exciting sort is likely to emerge.

Second, in those instances where students can cover the prerequisites for high school graduation at an earlier age in their secondary school career, then early entry into vocational and technical studies at a community college seems like a reasonable option. Joint attendance programs at high school and community college can now be found in South Carolina and elsewhere. They allow students to get a head start on postsecondary education and they capitalize on the built-in advantages of community colleges. These include the more flexible and entrepreneurial nature of the community college that grows out of its operation in a system that rewards productivity and responsiveness to the changing needs of employers. Currently no such incentive structures operate at the secondary school level. In fact, the incentives are backwards; the quicker and the better the high school educates its students, the faster it sees its revenues decline.

Since the community college is largely dependent on a satisfied clientele, it, like other well managed firms, stays close to its customers and tries hard to maintain a substantial degree of flexibility to respond to changing market conditions. The same can not usually be said of high schools. Because of their diversity and accessibility the American community college system is the envy of the European education community. These institutions also promise their students an adult environment which is often the tonic that high school students need.

So, you might ask, why not short circuit the current shopworn system, forget about the last two years of high school and allow 16-year-olds to move on to vocational studies, college or the workplace? Well, at present there is lots to learn in the core curriculum that is not being mastered. One doesn't have to look much beyond the latest international mathematics study to become convinced that U.S. secondary students are operating well below capacity. A comparison of 8th and 12th graders showed U.S. students consistently behind their Japanese counterparts and behind many other industrialized nations as well. In Algebra our 8th graders ranked 12th out of 20, while the Japanese were 1st. In Geometry we ranked 16th, while the Japanese were 1st. And in Measurement our students managed 18th place, while once again Japan was 1st. The U.S. ranked 12th in a field of 15 countries in knowledge of Geometry based on 12th grade scores from a smaller sample of students who were engaged in advanced math studies. The U.S. had a mean score of 30, while Japan's 12th graders scored 60 on a scale of 0 to 100. In Algebra we ranked

14th, scoring in the 40s, while Japan was close to 80. And, in Probability and Statistics the U.S. ranked 12th, making a 40, while the Japanese students ranked 2nd out of 15 countries on these comparisons, bested only by students from Hong Kong. These measures were only taken of those youngsters who are currently in school. Therefore, with a lower dropout rate the Japanese results represent academic achievement that is much more pervasive across each youth cohort.

What are we to make of this? That as a nation we can do a lot better. Why not start at a logical place-upgrading the teaching force. This can be accomplished by taking a few dramatic, but plausible steps: make teaching as a career a lot more engaging and rewarding - starting with competitive salaries and improved working conditions; free teachers from a host of procedural and regulatory constraints and invest them with authority and responsibility to run the schools - treat them like professionals; establish a rigorous certification process - like those developed by other professions; and install an incentive structure that rewards productivity rather than one that ignores it.

Such a prescription, if implemented widely, would go a long way toward moving us from the bottom of the scale on these international comparisons to the top. It would improve our chances markedly of operating a world class economy. It would also permit a lot more learning a lot sooner in a student's elementary and secondary career and thereby open the possibility for many alternate visions of post-compulsory schooling.

Let us just say we could accomplish by the 10th grade what we now try to accomplish by the conclusion of the 12th. We might look to Europe where there are a host of intriguing post-compulsory options in place; from continuing academic studies in an upper secondary school, to technical colleges, to apprenticeship programs linked to vocational studies, to "Further Education Colleges," to employment training contracts which provide work and training for youth and serve as a recruiting device for employers.

We might even look to Minnesota, where this Fall for the first time 11th and 12th grade students can enroll full-time or part-time in a Minnesota 4-year or community college, with the state paying the tuition and the students simultaneously earning credit toward both their high school diploma and a college degree.

In such a world, secondary school vocational education in the 11th and 12th grade would be a great option to have. How do we create such conditions? We need to demand and expect much more from elementary school, the middle school and the first two years of high school. In this way all our students can progress through the same core curriculum at a much accelerated pace and move on to vocational and technical education or whatever else captures their interest and imagination.

A faster pace might also cure a lot of boredom.

Commentary

J. Barry Ballard
Director of Vocational Education
State of Arkansas

It is hard to sort out the role of the reactor. You feel compelled to offer your own suggestions, but you can't ignore the title by your name -- reactor -- so I will try to resist the urge to offer too many of my own original ideas. I have had the privilege of working with Gary Hoachlander for a couple of years as he dealt with the problems associated with data, trying to describe analytically what voc-ed is in this country, so I have gotten to know him. Today, I appreciate him all the more because I have learned that some of his philosophies on vocational education agree very much with my own.

I agree with his comment that there is a clear or proper role for vocational education in the high school curriculum. And I agree with his observation that the things we do at the high school level are too process-oriented, that many accountability and quality control measures are too process-oriented, and that we need to focus a bit more on the outcomes and product evaluation. I think there are some beautiful and rich opportunities for us to do precisely that.

Also, I feel that employability and the extent to which students are placed on jobs related to their training cannot be the sole measure for a successful vocational education program because there are so many other factors related to employability. The idea of somehow tying in and measuring both access and completion is an excellent concept, one that is worthy of pursuing. Though the placement issue needs to be toned down somehow, I think there needs to be some accountability for schools, some programs to ensure that what they are offering is somehow relevant to the job market, that we are, in fact, not training students for jobs that do not exist.

Carol Gisbon's heart is in the right place and she very articulately described a situation where resources from a lot of different places were brought together and officials from different schools and vocational education programs sat down together with their feet under the same table and reflected and analyzed the problem and each said, "We should be able to do these kinds of things." Then each party acted out its commitment and made it work. I think she very successfully presented a beautiful "what if" model.

It is clear to us that so many of our resources are poorly used. We cannot always get the federal youth job training money to apply to an "in-school" program. I know we could do a better job pulling together our Job Training Partnership Act bucks, our state minimum foundation aid bucks, our federal vocational education bucks, and our corporate bucks to make them an articulated resource to serve especially the critical needs of our at-risk students. These equity issues cannot be ignored and I think they must always be a part of "what-if" kinds of discussions.

David Mandell said a number of things that I strongly agree with, but as a vocational educator, I must tell you that I disagree with the fundamental context of what he was sharing. I think there are three issues that he overlooked and three assumptions were made that may not be valid. First, an earlier speaker said that there had been an argument going on for a hundred years about the role of vocational education. We are reminded through David's paper about that argument. The argument revolves around the questions which follow. Are students mature enough to profit from vocational instruction? Do they have the basic skills to profit from vocational instruction? Are they informed enough to make an appropriate career choice? If not, then vocational education, especially the job-specific vocational education, probably ought not be in the high school curriculum.

The other side of that coin is that there are many who are mature enough to profit by vocational instruction. There are many who have the basic skills sufficient to view vocational education as a secondary but profitable experience. And, I think he overlooked the fact that

students have different learning styles. The learning styles of many students are not compatible with the purist's approach of general studies and the basics. I noticed that he also added literature and high-order cognitive skills to his list of basics and later talked about probability and statistics as examples. Wow!

I believe that the learning styles of many of our students are best served through very pragmatic approaches where students are able to reinforce what they have learned in their math and science labs. I would also say that I think vocational education has generally missed a rich opportunity to serve as a tool to help kids learn basic skills, and ought to do so.

All the research that I have been able to study recently on that indicates that just the slightest bit of attention from the vocational teacher to reinforce those basic skills gets excellent achievement results. When the vocational teacher collaborates with the general studies teacher in math or writing or whatever, dramatic results are achieved. So certainly it would be my recommendation to take better advantage of the vocational education resource in our schools to help kids learn basic skills.

Another thing I think Mr. Mandel overlooked was that a large proportion of our high school graduates never take additional formal education beyond the high school. In some of our schools -- and I have worked with the educational systems in four states -- the vast majority of the kids that leave the high school never get another day of formal education. So, if we abandon the vocational education experience at the high school, then we probably commit a large portion of our youth to underemployment and unemployment.

Another thing overlooked is the responsibility of our schools to play some role in helping youth make a successful transition from school to work. Our schools cannot turn their backs on that responsibility. Some of the assumptions made here -- that all or most of our youth will go on to college and get the needed specialization -- are faulty. We know that the number of jobs in our economy that are unskilled or semi-skilled is diminishing. The vast majority of jobs right now require some kind of specialized skills, and the presumption is that all kids will go to college or community college, after high school. The discussion of compulsory schooling after high school is a very interesting concept, but I think we are a long way from it.

Another assumption Mr. Mandel made was that a strong basic skills program in our secondary schools and vocational education are an either/or proposition. I don't think many of us vocational education folks have ever viewed vocational education and basic skills as an either/or proposition. I think you can have strong, rigorous quality programs in both.

Third, the assumption that all youth in high school grades are similarly motivated with good egos and strong self-concepts and view themselves pursuing high-waged careers with college degrees in hand is false. We know, as Carol Gibson so beautifully reminded us, that we cannot ignore high-risk students, we cannot ignore the students that are handicapped and disadvantaged and are not normal. And, we cannot ignore those whose career needs and interests are not pursued on a college campus. We can't ignore those who, like the previous speaker said, struggle with "my father and my grandfather were lawyers, but I don't want to be a lawyer; I want to be a machinist or I want to be something else." There needs to be a place in schools where kids can exercise that kind of option.

My appeal would be that although David said many things I agree with about the work experience and that basic skills must be first, we have got to provide those other options. My suggestions would be that we use vocational education as a mechanism to help kids develop those basic skills and to reinforce what they are getting in the other parts of the curriculum.

I think our programs and evaluations are too process oriented, we need more product evaluation, and I am encouraged by the whistles of the trains I hear blowing in the automotive industry and others for testing and assuring competence. I think that we need and must have strong basic skills. The basic skills of our students must be assured. But, we also need to maintain vocational education as an option for those students who need and want and can profit by it. Harry LeColst's words this morning will always ring in my ears -- when he said, "I get a lot of young people coming and knocking on our doors begging for a job and they have no skills to sell."

Commentary

Ann Bardwell

Vice-President

National Association of State Boards of Education

Kentucky State Board Member

I am a self-committed generalist and announce it regularly to most any group with whom I work. I am committed to life-long education and a strong advocate in the Commonwealth of Kentucky for early childhood education. I would second the comments that an investment in our young children will provide the best return on our money. But, I am also committed to vocational and technical education.

So, I am divided when it comes to deciding where we put our emphasis. As state policy makers, we have to ensure equity, equality, and equal access. Those are the issues we must address, issues we have heard raised.

Carol Gibson says that you can identify dropouts at the sixth grade level; I believe you can do it even before that. Kids turn school off as early as the third and fourth grade. Certainly that is reason to invest in early childhood. As an advocate of equality, equity, and access, I am concerned about the quality of education that permeates the education continuum: beginning either at pre-school or kindergarten, certainly running through elementary and secondary vocational training, wherever it begins in the high school, the technical school, professional school, or at the college level. I have one other concern - and that is a personal and professional concern for the changing demographic character of our nation.

We have heard about the changes in the work force and the impact of education on economic development. We say that one-third of the population by the year 2000 is going to be supporting the other two-thirds; I am going to be a part of that two-thirds that's being supported. When I made my "pitch" for early childhood education to the House Education Committee, I said, "I want those young people in that one-third to be the best trained and the best educated, because they have to pay my Social Security."

We are setting education policies today that should help to prepare that two-thirds. We can make some changes in what's happening to students currently enrolled, but we need to be concerned about the outcomes twenty years from now. Who is going to be the wage-earner twelve or fifteen years from now? I am concerned that we, as state policy makers, and you, as professional vocational educators and researchers and economists and business leaders, must develop the kind of delivery system that is going to be designed for people who can think, solve problems and adapt to new situations.

I support the suggestions in the preceeding papers. We must produce the best thinkers and cognitive processors we can. But they have to be able to read, write, and compute first. We have to develop a delivery system that is really going to ensure that method of putting theory into practice, and a creativity and a quality of the mental attitude and the mental processes that go on.

We have to assure the opportunity to understand about the world of work, and that ought to begin as early as possible. Whatever we do as state policy makers, we must continue to be sensitive to the need to facilitate those kinds of delivery systems.

We must be oriented to strategic planning. Certainly enough has been written about vocational education. It's time to act. Vocational education has been studied in Kentucky, almost to death. We have had nine plus studies in ten years, and we have made no significant changes yet. The General Assembly may do it for us, and we on the State Board, must provide the needed flexibility to accommodate them. As policy makers we have to be able to ensure a governance structure and delivery system that are flexible, feasible, financially responsible, and can be evaluated.

Then we won't be asking these same questions five and ten years from now. But we will have developed and set into place some kind of strategic planning process that will take what we know, use it, and spit it out fast enough to make it work and make it worthwhile.

**THE TEACHERS:
QUALITY AND SUPPLY**

The Education of High School Vocational Educators

Willis D. Hawley

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Introduction

While vocational education and the preparation of teachers are under increasing attack, the education of vocational education teachers is receiving very little attention by policy makers, researchers, and vocational educators. With a few exceptions, the dozens of national studies and reports published in recent years have said little about vocational education, much less the education of vocational teachers. The host of studies dealing with the effectiveness of vocational education that began to appear in 1979 virtually ignore teacher preparation. The new Third Handbook of Research on Teaching (Wittrock, 1986) does not mention the word vocational.

Much of the recent discussion and writing about vocational education has focused on whether the nation should continue to support vocational education at the high school level. These critics, who think we could do without vocational education as we know it, ¹ have little interest in teacher education and, understandably, the advocates of vocational education seem to focus on the defense of the system rather than on fundamental problems like the quality of the teaching force. ² In addition to the controversy about the effectiveness of vocational education there are a number of philosophical arguments about vocational education in public schools, the most common of which relates to the importance of a broad education to citizenship and opportunities for experiencing the richness of life outside of work.

For those of us who believe that the country has overinvested in vocational education, it is tempting to declare the question of how we should prepare vocational educators moot and to move on to other issues. But the vocational education system has demonstrated considerable staying power, and about one-fourth of the nation's high school students are in vocational programs. Many more take vocational courses. Moreover, vocational education students come, disproportionately, from those populations most in need of quality education (Datta, 1982; Berryman, 1982). Thus, whatever one's views about the efficacy of vocational education in public schools, it seems as important to try to improve the education of vocational teachers as it is to improve the education of other teachers.

Goals for the Preparation of Vocational Educators

It seems reasonable to assert that strategies for preparing vocational educators should follow from the purposes of vocational education. There are, however, a multiplicity of goals and little consensus about priorities (Swanson, 1982). Indeed, there are many views of how best to define vocational education and a proliferation of some 400 or more specialties for which students are trained, and many of these are approached in different ways.

Reducing this indecision about goals is the first step to improving the preparation of vocational teachers. However, the debate over the goals of vocational education has been going on unabated for at least 70 years, and we will not resolve this matter here. So, let me leap-frog the problem of clarifying the goals of vocational education and outline some simple assumptions about its future about which both its critics and defenders seem to agree.

- There will be increasing concern for the propensity of vocational education to isolate vocational education students from others.

- There will be greater emphasis in vocational education programs on the employability of students rather than on their occupational readiness, and this will be coupled with higher expectations for the mastery of computational and communication skills.

- A correlary of the increased emphasis on employability will be a concern for the ability of students to be adaptive, to learn new things, and to solve problems.

- More specialized and technically sophisticated programs will shift increasingly to postsecondary institutions.

- Increasingly, specific skills training will be deinstitutionalized, that is, students will increasingly learn specific occupation skills in work places and be taught by persons whose primary occupation is not teaching and who have no formal training in how to teach.

These assumptions have important implications for the education of vocational education teachers. Let me turn now to that question.

The Essential Elements of Teacher Preparation for a Career in Vocational Education

Even if we cannot clearly specify the purposes of vocational education, it does seem possible to identify some key characteristics of vocational educators about which we might expect little debate. There are, of course, many types of people who teach vocational students. I intend to focus on the preparation of full-time college-trained career professionals on the assumption that the success of the vocational education system will inevitably depend on the effectiveness of the cadre of professional teachers who will give the system stability and whose expertise and status must be at least as great as the expertise and status of the teachers of so-called academic subjects. I submit that the vocational educators we want to attract, develop, and retain would be:

- well educated in the sense that they have an extensive exposure to the humanities and the physical and social sciences;

- knowledgeable about the subjects to be taught;

- understanding of how children learn and capable of employing a repertoire of strategies for facilitating learning;

- committed to teaching and empathetic and responsive to individual and group differences among students;

- able to adapt their behavior in response to the systematic analysis of complex problems;

- aware of how schools can be made more effective organizations.

These general characteristics are being sought in all types of teachers. They are not abstract preferences; they can reasonably be linked to effective teaching. The problems that complicate the design of preservice teacher education are: (a) the identification and implementation of strategies that will attract and/or produce these characteristics, (b) the setting of criteria and standards, and (c) knowing when these measures are being achieved.

I want to focus on the first of these tasks. While it is clear that we could not systematically judge the relative effectiveness of strategies for selecting and enhancing various teacher capacities without accomplishing the second two tasks, it seems reasonable to argue that the "essential elements" of a teacher preparation program outlined below will move us in the right directions. Because there appears to be so little research -- or even informed consensus -- on effective vocational teacher preparation, I will draw on inquiry and commentary relating to teacher education in general and try to adapt or elaborate these ideas so that they address issues that seem particularly to vocational education. The assumptions about the future of vocational education and the criticisms outlined above influence my conclusion about how to make general propositions responsive to the redesign of preservice preparation programs for vocational educators.

1. Selective admissions and performance-based screening.

Everyone agrees that selective admissions should characterize teacher education programs. But there is little agreement about either the criteria or the standards that should be applied. Conventional college admission tests like the Scholastic Aptitude Test and the American College Tests have little relationship to any outcomes people care about (except scores on other tests) much less teaching performance (Lysakowski and Walberg, 1982; Evertson, Hawley and Zlotnik, 1985). Some reformers have argued that teacher candidates should be chosen from the top half of the graduating class unmindful, seemingly, that this would mean that 50 percent of all such graduates would become teachers. And, even if such a major shift in the allocation of academic talent within the workforce were desirable, it would require a massive increase in teacher salaries, probably about 50 percent even assuming that other sectors of the economy did not respond with salary and wage increases (Manski, 1985).

It seems sensible, given the difficulties of finding feasible and valid ways to screen out potential teacher candidates to recognize that (a) the issues we are trying to resolve include both competence and status, (b) college should be able to add something to a person's competence, and (c) admission to college and to the teaching corps should be receiving at least as much attention as admission to teacher education. If one accepts these propositions the following procedures seem workable and responsive to the problem. First, require all entrants to four-year colleges to pass a basic skills test with minimal standards based on the median performance of high school graduates. Singling out teacher candidates to take these tests stereotypes such students as less able, weans bright students away from teaching, and generally demeans teaching. Second, whatever the admission standards are for any given college, make them higher for admission to the teacher education program. It does not matter much what these standards are; relative selectivity will go a long way toward improving the status of teaching. Third, certification to teach should rest heavily on demonstrations of actual teaching knowledge and competence demonstrated by performance in college and on the job. Evaluations of on-the-job performance would be facilitated if we were to establish Professional Development Schools through which all would-be teachers entered the profession (see point nine below) and if we were to establish systematic evaluation processes for novice teachers.

2. Broadly distributed coursework in the humanities and the social and physical sciences.

There is little debate about this proposal. Again, differences among college curricula make it difficult and unwise to be too prescriptive about the specific distribution of courses. One guideline might be that at least half of one's college courses should be in what we loosely call the liberal arts. But it is important that reformers of teacher education recognize that liberal arts

curricula are coming under increasing attack for being poorly taught, lacking in rigor, and adding up to less than the sum of their disparate and unarticulated parts. Thus, reform of undergraduate education generally needs to be added to the agenda of improvements needed in teacher education.³

3. Thorough knowledge of the subject(s) to be taught.

For most high school teachers, the implication of this guideline is straightforward -- they major in an academic field such as history, English, or mathematics. The appropriate field of study for the vocational educator often is less obvious. A strong case can be made for having vocational educators satisfy the requirements of a conventional academic undergraduate major. For example, nutrition, agriculture, computer sciences, and economics have rather direct relevance to some vocational subjects. This may mean that persons preparing to teach vocational education would have to acquire certain work-related competencies in the summers or working part-time with no credit. The more academically rigorous the field of study is, the more intellectually confident the student-teacher will be, and the more status vocational educators will have among fellow-teachers and parents.

4. Rigorous professional (or pedagogical) courses that reflect the latest research on learning and teaching both with respect to content and instructional strategies used.

There is a growing body of knowledge about student learning, effective teaching, and good schools (Wittrock, 1986; Hawley and Rosenholtz, 1984; Berliner, 1985) that has yet to work its way into the curriculum of many programs for preparing vocational educators. Remedying this shortcoming, one that characterizes teacher training programs generally, probably means that some topics now dealt with in the vocational education preparation programs will have to be jettisoned and many courses will have to be redesigned (and professors will have to be retooled). This research base tells us not only about effective teaching, it draws attention to the needs of particular groups and the failure of schools generally to meet those needs.

Vocational education students are drawn disproportionately from the ranks of lower achievers in academic subjects (Datta, 1982). It is also the case that the achievement gap between higher and lower achievers usually widens as students "progress" through the grade levels (Berryman, 1982).

One of the major claims being made for vocational education is that its use of hands-on experiential teaching techniques can reach students for whom conventional instruction does not work. Even critics of vocational education point to this strength. For example, the influential Southern Regional Education Board (SREB) recently centered its recommendations for improving vocational education on ways to increase the contributions vocational education makes to students' "academic skills" (SREB, 1985). There is, however, little evidence to support the notion that vocational education typically makes such contributions to students (Berryman, 1982).

It is no easy matter to merge vocational and academic education. Few vocational education teachers have the training they need to teach computation and communication skills, especially when students being taught need remedial help. Appropriate texts do not exist in many fields. Team teaching, a commonly proposed strategy, is expensive and difficult.

The demands on vocational education that it emphasize the development of academic skills in order to promote the employability, flexibility, and adaptiveness of students require that major changes be made in the way vocational education teachers are educated. For example, how many teachers who are not mathematics majors could teach geometry, as the SREB urges, by having students calculate designs for a construction project rather than by solving workbook problems? Thus, not only should prospective vocational education teachers be developing their capabilities to teach mathematics and language arts, but they should be reasonably knowledgeable and proficient in these subjects. Because the courses through which one might engage in such learning are typically designated as ways students can meet their so-called distribution requirements, this stipulation need not result in extending the total number of courses a "well educated" undergraduate usually takes.

5. A professional curriculum that embodies general social and behavioral theory and modes of systematic inquiry.

Teacher education courses are thought, almost everywhere, to be less intellectually rigorous than most other college courses. One reason for this is that too often too little is expected of students preparing to teach. But another reason education courses are considered relatively undemanding, even where workloads are heavy and standards are high, is that much teacher education focuses on how to do things -- on the craft of teaching. Such applied courses seldom explicitly engage theory or modes of systematic inquiry in the way the best liberal arts courses do.

The introduction of more academic rigor, then, involves more than asking teacher candidates to work harder in college. It involves the redesign of the curriculum so that students preparing to be teachers are better able to recognize that the issues with which they must deal often reflect general problems and dilemmas that continue to intrigue the most learned sociologists, psychologists, economists, historians, and philosophers.

One example may help make this point. One course all teachers say they value -- or which they had -- is classroom management. The issues with which teachers deal in structuring the learning process have to do with the sources of social order, the consequences of conflict, the tradeoff between addressing the needs of individuals rather than the social group, the importance of race and class in interpersonal relations, and so forth. But few courses on classroom management treat these issues as anything more than a practical problem to be solved -- as if there were ready solutions. Why wouldn't the writings of Locke, Rousseau, and Hobbs -- among others -- be relevant and intellectually meaningful for students of classroom management? Why shouldn't prospective teachers be aware of the enduring conflict between equity and equality, between libertarian and utilitarian philosophy, and between the needs of community and of society? And if issues of racial and ethnic differences are dealt with by some teacher preparation programs, class differences are not -- as though one could understand racism in America, for example, without understanding the importance of class and caste in social ordering and the shaping of the expectations individuals have for themselves and for others.

Content is but one dimension of curricular rigor. Another is that students are asked to address complex issues using modes of inquiry which are systematic and diverse. Inevitably, teaching is an uncertain technology. Good teachers must know how to interpret the complexity they confront, to undertake experiments, and to interpret outcomes. These capabilities not only are useful to good teaching, they are tools of creative and effective people in most professions. Which leads me to the next proposal.

6. A focus on the development of the problem-solving skills of prospective teachers.

As just implied, teaching may be thought of as problem solving. Not only are there few teaching strategies that work equally well in different settings and with different students, the knowledge base of teaching is rapidly expanding. Thus, in addition to having analytical capabilities, teachers must be active learners who are also capable of reflection and flexibility. It is clear enough that neither schools nor colleges do a very good job in helping students become problem solvers. Few teachers and few college professors know much about the research on human cognition and problem solving, and most curricula do not explicitly reflect that research. Teacher education cannot, by itself, bear the burden of change in this regard; but the status and consequences of teacher education would be enhanced if what is known about problem solving importantly shaped the content of teacher preparation courses and the way they are taught.

7. Professionally oriented subject matter that deals with how schools are affected by and can influence other sources of student learning.

There are many non-school sources of student learning and development, and educators typically feel that these are beyond their influence. But teachers and administrators can do a better job of linking schools to other social agencies, and this is particularly important for vocational

educators. While teachers cannot be expected to create inter-institutional relationships, they will often be responsible for maintaining them.

The increasing deinstitutionalization of vocational education is inevitable because of the rapidly changing needs of workplaces and the costs of replicating equipment and other technology found in workplaces. To the extent that vocational education is carried out in cooperative programs with business and industry or by individual craftsmen and technicians who have not been trained to teach, it will be important for vocational education teachers to monitor student performance, train instructors, and otherwise ensure that student needs are being met.

Perhaps the most important non-school influence on learning is the student's family. Most teachers have little training about how to involve parents in the education of their own children even though such teacher initiatives can make a big difference in parental behavior, particularly for lower income families and single parents (Epstein, 1985; Rosenholtz and Hawley, 1984, Ch. 6).

8. The use of educational technology by students and faculty throughout the curriculum.

I have argued that good teachers must collect and use enormous amounts of information to solve complex problems in inevitably labor-intensive ways. These characteristics of effective teaching, coupled with the importance to the facilitation of learning of the multiple ways of organizing and representing knowledge, make it likely that computer-related technology would greatly increase teacher productivity. But few teacher education curricula make effective use of computers. A course in computer literacy will not do the trick. When would-be teachers find that their education is furthered through the interactive computer-based learning which computers make possible, they will become users of such technologies. Here again, the importance of investing in the retraining of teacher educators -- and the rest of the professoriate -- is manifest.

9. Induction to teaching through "professional development schools jointly operated by selected universities and school systems.

Of all the structural problems that bedevil teacher education, the most fundamental is the problem of inducting teachers to the profession. The current pattern of moving from college directly to the loneliness and complexity of classroom teaching leaves many first-year teachers frustrated, disillusioned, and less capable of effective teaching than before they started their first job. There is growing consensus that the solution to the problem is the development of a new stage in the teacher education process, a year-long internship in a school serving typical students that is especially organized to induct teachers.

Such schools -- which are being called professional development schools, teaching academies, or portal schools -- would be similar in function to teaching hospitals where physicians learn their clinical skills and would be staffed by university faculty and master teachers who are experts in both teaching and teacher education.

Professional development schools (PDSs) could make several important contributions to teacher education, and most of these are particularly relevant to vocational education. First, they would provide beginning teachers with a carefully supervised and supportive introduction to teaching so that teacher learning can progress and the intrinsic rewards of facilitating student learning can be experienced. Practice teaching does not begin to meet these needs and is, in fact, highly overrated (Evertson, Hawley and Zlotnick, 1985). We could abandon it if we established PDSs.

Second, PDSs would create additional room in the college-based curriculum because some courses -- like subject matter methods and practice teaching -- can best be taught in the clinical settings PDSs provide. This, in turn, would permit college-based coursework to be more pre-professional. PDSs would not, however, diminish the importance in teacher preparation course of experiential learning and opportunities to apply what one thinks one has learned.

Third, because they allow intensive observation of interns by specially trained teacher educators and because their staffs would have no economic incentive to attract or graduate students, PDSs are likely to serve as very effective and nondiscriminatory mechanisms for screening

would-be teachers to determine whether teacher candidates should be allowed to assume responsibilities for their own classrooms.

Fourth, PDSs could serve as alternative teacher training institutions through which technical vocational personnel could be trained or fast-track programs aimed at meeting shortages in particular teaching fields could be implemented.

Conclusion

I have listed nine proposals that seem likely to improve the preparation of vocational educators, but I have intentionally avoided prescribing specific models or the one best way. The time has come to experiment with different strategies for attracting and preparing the quality teachers we desire. The history of teacher education reform has been a continuing effort to prescribe in ever greater detail who can teach and what specific courses they should have. Vocational education requirements in many states are a parody of teacher certification generally. Current efforts to reform teacher education follow the same regulatory impulse. This emphasis on detailed processes and procedures has not worked. It has given us a highly regulated system known for its resistance to change and attacked on all sides for its inadequacy.

Instead of trying to regulate our way to change -- a contradiction in terms -- it is time to focus on the outcomes of teacher education, to select teachers in terms of their knowledge and performance, and to strengthen the market for high quality teaching and the capability of consumers in that market to give direction to the means of production.

To these ends we need to:

- encourage innovation in the ways we prepare teachers;
- develop better ways of measuring the knowledge and behaviors it is reasonable to expect teachers to have at different stages of their professional development;
- hold teacher preparation programs accountable for effective production (measured by teacher candidates' knowledge and capabilities) and hold school systems accountable for the performance of the teachers they hire;
- strengthen the education professoriate and improve the facilities and equipment it has to work with;
- allow the price for teachers with scarce capabilities to float with the market.

This last point serves to introduce a final point. The reform of teacher education depends on the reform of schools. If schools are not places in which intelligent, well-trained professional teachers can employ and enhance their expertise, the reform of teacher education will be a waste of time.

1 Criticisms and critical research relating to vocational education include Levin and Rumsberger, 1985; National Commission for Employment Policy, 1981; Committee for Economic Development, 1985; The Southern Regional Education Board, 1985; Berryman, 1982; and National Institute of Education, 1981.

2 Defenses of the role and efficacy of vocational education include, The National Commission on Secondary Vocational Education, 1985; Mertens and Gardner, 1983; and Campbell, 1986.

3 The relative lack of concern, even among vocational educators, over the education of teachers is reflected in the virtual absence of this issue from the school improvement agenda. For example, the American Vocational Association's National Agenda, published in 1981, does not deal with teacher education; one exception to this generalization is a report by The Committee on Vocational Education and Economic Development in Depressed Areas (1983) of the National Academy of Sciences.

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Vocational Agriculture Teacher Preparation

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An adequate supply of qualified personnel is essential to the well-being of any program, agency, or business. This is certainly true in education. Vocational education is one of the areas where teacher preparation is particularly critical because of the technology requirements.

In addition to the good general education that is expected for all teachers, vocational teachers must be proficient in an occupational area. For example, business and office teachers must know "all" about office occupations and auto mechanics teachers must know about automobiles. Further, the technology in their occupational area is continually changing, and they must try to keep up to date.

Individuals charged with the preparation of teachers must have a thorough understanding of the nature of the work of teachers as well as the appropriate theoretical foundations. Unique features of an area also must be considered. The purpose of this paper is to describe some of the considerations and procedures followed in the preparation of teachers of vocational agriculture.

Teachers of Vocational Education

Vocational teachers are obtained from two primary sources, colleges and business. The traditional way and most appropriate path is through a college. They will have completed a baccalaureate degree program specifically designed to educate them to be professional teachers or, in some cases, a baccalaureate degree in a particular subject area plus additional undergraduate or graduate education to develop teaching abilities. The second way of obtaining vocational teachers is to hire individuals who have worked in a trade for a few years. These individuals may have no college-level preparation of any kind and, as I have observed in schools, may be barely literate in some cases. Their level of skill and experience is said to offset the need for college education. My personal observation is that these individuals may do a poor job of educating youth and adults. They may be highly skilled in an occupation but often are not able to help youth aspire to improve their situations in life, their language skills, or their citizenship. This is particularly important when we realize that a high proportion of vocational students come from disadvantaged backgrounds and need all the help they can get to move into the mainstream of society. Students in classes under these teachers often sense that they have substandard teachers. Rarely does a non-college-prepared teacher embrace the kind of professional demeanor so essential in teachers who can uplift youth.

Those teachers in various areas of trade and industry typically are not college prepared. With the increase in area vocational schools, some non-college-prepared agricultural occupations teachers have been hired. This started in the 1970s as education officials rushed toward occupational specificity in area vocational schools. However, the non-college-prepared teachers know little about running a vocational agriculture program.

The Vocational Agriculture Program

Vocational agriculture is not just a class or a subject; it is a comprehensive program. Teachers who run the program in local high schools are more than agriculture teachers. The typical vocational agriculture program consists of classroom and laboratory instruction, supervised occupational experience, and student organization activities. Many teachers also carry out adult instruction. Some postsecondary schools have technical agriculture education.

There are 8,925 secondary schools with vocational agriculture in the United States. Of these, 3,161, or 35 percent, are in the South (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia). There are 338 postsecondary programs in the United States, with 60 in the South. Some people believe the South has a disproportionately high number of vocational agriculture programs. But we must recognize that agriculture is important to the economy of the South; social and cultural conditions result in certain expectations for the schools to teach vocations; and many residents of the South continue to practice small farm agriculture as a way of life.

Vocational agriculture programs are planned locally with instruction based on the agriculture in the school district. Teachers use needs assessment procedures and advisory groups to help plan their programs. Just as agriculture is more than farming, vocational agriculture programs are more than production agriculture. They have expanded to include forestry, horticulture, agricultural mechanics, agricultural supplies and services, and agricultural products.

The local dimension of vocational agriculture requires that teachers have skills in studying agricultural situations and making program interpretations. Community survey procedures are followed and citizens' advisory groups are formed and used for input. (In recent years some efforts have been made to standardize curriculum using quick-fix, superficial curriculum guides. This is unfortunate and has weakened vocational agriculture where this approach has been used.)

Students are provided practical supervised occupational experience, which is an individually planned program of experiences designed to give meaning to classroom instruction through real-world experience. Students work after school hours and during the summer on farms, in agribusiness, or in other situations where agricultural skills can be developed. This practical experience and on-the-job learning are very beneficial to students.

The student organization Future Farmers of America (FFA) is a vehicle for encouraging the development of leadership and personal skills, rewarding accomplishments, and recognizing achievement. Though the name may not appear appropriate to all facets of a modern vocational agriculture program, the organization continues to provide rich benefits to its members through revised, up-to-date programs. In many schools, FFA activities have helped youth set their sights on improved standards of living and advanced life goals.

Vocational Agriculture Teacher Preparation

Ninety-four colleges and universities in the United States have programs to prepare teachers of vocational agriculture. Of these, 21 percent are administratively located in colleges or departments of education, 75 percent are in colleges or departments of agriculture, and four percent are administered jointly by colleges of agriculture and education. Those in agriculture usually abide by teacher education governance regulations in the college of education. Programs administered by the college or department of agriculture tend to be better staffed and to have more resources and therefore may be closer to the cutting edge of agriculture technology.

The preparation of vocational agriculture teachers may be divided into three areas: pre-service (often considered as undergraduate education but not exclusively so), graduate education, and in-service education. There is some overlap between graduate and in-service education.

In-service may be provided through credit courses or non-credit workshops or other activities.

Vocational agriculture teacher pre-service curricula typically require more credits for graduation than other education curricula. At Mississippi State University, for example, most teacher education programs require 128 semester hours; vocational agriculture teacher education requires 136 semester hours. Nationally, the curricula typically require 20-30 percent of the credits in general education, 20-30 percent in professional education, and 30-40 percent in agriculture and related technology courses. Ten percent is for electives (Berkey, 1981).

Graduate education usually involves pursuing advanced degrees, completing courses to keep state-issued teaching certificates valid, and helping teachers keep up-to-date in agriculture and related technology. Advances in certification and salary are usually tied to the completion of graduate work. Masters degree requirements typically involve about half professional education and half agriculture and related technology courses.

The requirements for becoming a vocational agriculture teacher can be described as fitting three broad areas: academic requirements, experiential requirements, and certification requirements. Regulations of state certification agencies, regional accrediting agencies, and teacher education accrediting agencies must be met, even though some of these regulations don't contribute to the quality of vocational agriculture teachers.

Academic Requirements

Future vocational agriculture teachers must complete requirements in general education, agriculture, and technology, and professional education. Further, many colleges and universities have core curriculum or institutional requirements which must be met. Vocational agriculture teachers need to be well prepared to function in a variety of roles, and this requires much more than agriculture courses.

General education for vocational agriculture teachers includes heavy emphasis on technology. General education is normally comprised of English, social studies, mathematics, the arts, speech, and science. Since agriculture is science in action, vocational agriculture teacher preparation curricula require considerable emphasis in the physical and biological sciences. Science course requirements often include chemistry, botany, zoology, physics, and genetics. These courses undergird agriculture courses in areas such as soils, entomology, nutrition, animal physiology, plant pathology, and reproduction.

Computer literacy is now a requirement in the general education of vocational agriculture teachers in most colleges and universities. As a result, vocational agriculture teachers have served as change agents and advocates of microcomputer technology. In many schools, the vocational agriculture teachers were the first teachers to have microcomputers and skills using them. In Mississippi, the agriculture teacher education department was the first at the university to offer a microcomputer applications course outside of the computer science department.

The requirements in agriculture and related technology have traditionally included heavy emphasis on production agriculture. Largely, this is still the case and rightly should be since production agriculture undergirds all of the modern agribusiness sector. The curricula are being revised to include a core of essential production agriculture courses and the opportunity for specialization in various areas such as agricultural mechanics, horticulture, agribusiness, and natural resources (forestry and wildlife). Emphasis in these course requirements is on the application of science and technology. Examples of courses include those in weed, insect, and disease control (examples are herbicide technology and integrated pest management); soil and water management; and agricultural mechanization. Also included is emphasis on the management of farms, ranches, and agribusiness. Students take courses in agricultural economics, accounting, marketing, and management.

Professional education courses are typically concerned with human development; learning theory; how to plan educational programs; and how to plan, deliver, and evaluate instruction. Good teaching requires more than being "filled" with subject matter. Students in agricultural teacher education are taught to use the scientific method as a major instructional tool. This involves a teaching strategy known as problem solving. The strategy involves planning instruction on the basis of clientele needs (problems and interests), providing information in an organized manner around the concerns of the clientele, and allowing students to test possible solutions and reach courses of action on the basis of their observations. For example, selecting the variety of soybean to plant might involve studying reports of research trials, visiting demonstration plots or farms, establishing trial plots on students' farms, and seeking input from specialists. The vocational agriculture students then reach a decision on which variety to plant.

The pedagogy vocational agriculture teachers are trained to use differs from that taught traditional classroom teachers. There is more emphasis on learning through experience. Teaching techniques includes demonstrations (both method, or how to do something, and result, what happens if something is done such as following the recommended technology in producing a crop), field trips, using laboratories (including agricultural mechanics, horticulture, school farms, forestry plots, and meats processing), and a variety of discussion procedures. The discussion procedures include considerable learner participation. Discussion techniques have been found to be very useful in stimulating the adoption of new technology by farmers and others in agriculture.

Another aspect of teacher preparation deals with the fact that a vocational agriculture teacher is a change agent. Providing information about new technology is not sufficient. Instructional approaches that enhance adoption of the technology are used, such as individual instruction on farms and in agribusinesses. This is a "clincher" in the changing of practices that may be followed by farmers and others in agriculture. Individuals are much more likely to adopt a practice if they have observed how it can solve problems and are individually followed up by the vocational agriculture teacher.

Experiential Requirements

Vocational agriculture teachers need to be well-grounded in the practical aspects of agriculture. A few years ago nearly all young people who chose to prepare to teach vocational agriculture had an abundance of practical experience. Many of the current undergraduate students in teacher preparation programs lack experience; therefore, some mechanism must be used to expose them to the everyday world of agriculture. This is often achieved through experiential requirements, although some states require only a minimum of agricultural experience in order to be certified.

Some individuals acquire work experience on their own; others are placed on farms or in agribusinesses during the summer. Mostly it is non-credit experience in agriculture. Agribusinesses and agencies are now offering paid summer internships.

Some agricultural teacher education programs require supervised field experience. For example, Mississippi State University requires a minimum of three weeks of experience in a local school district under the direction of a master agriculture teacher. This is separate from student teaching. The prospective teacher may spend one or two days each in a variety of agencies, agribusinesses, or farms. Such experience is carefully documented and, hopefully, internalized by the individuals involved. It helps develop their ability to deal with a variety of agriculture clientele at the local level and helps prospective teachers realize that vocational agriculture, even though it is administered by the school, is a community-based educational program.

Various structured community-based experiences may be required, including case studies of farms or agribusinesses, review of courthouse or agricultural agency records, and using computer simulations prepared by various agencies.

Certification Requirements

State certification requirements for vocational agriculture usually consider the unique needs of vocational agriculture teachers. The requirements also tend to force all prospective teachers to achieve a satisfactory score on a standardized test. Sometimes certification regulations need to be more flexible and consider the differences and needs in vocational agriculture. For example, emphasis on just classroom teaching is far from sufficient in vocational agriculture. School-based staff development activities also frequently fail to meet the needs of vocational agriculture; yet emphasis on such programs is increasing among various states.

The Future in Vocational Agriculture Teacher Education

A number of trends in agriculture and education affect the kind of preparation needed by vocational agriculture teachers. Agricultural technology is continually undergoing change and teacher preparation programs must adapt to include the kinds of experiences and education teachers need. It is difficult but important to keep teachers on the cutting edge of agriculture technology.

Education, too is undergoing much change. The educational reform movement ignores the uniqueness of vocational agriculture. For the convenience of educational administrators, some vocational agriculture teachers are being required to embrace a school-based program. Three examples are: state-wide core curricula are being adopted; all teachers are being required to take the same in-service training; and all teachers are being required to meet the same performance criteria without regard to the mission of vocational agriculture.

The big challenge is to keep vocational agriculture as viable and responsive to changes occurring in the South. Vocational agriculture must embrace new technology and contribute to the diffusion and adoption of new agricultural practices. The program must be pliable yet cling to a community-based approach to educational programming. The instructional methodology should help local communities adapt to economic and social changes. All of this will require professional educators who are well qualified to perform their duties. The procurement of such individuals will be difficult. Negative factors in personnel recruitment include low salaries, the perception that working conditions are poor, lack of career ladders or opportunities for advancement, numerous certification regulations, and a less than desirable image of teaching as a profession. We must meet these challenges. Maintenance of our high standard of living requires a productive agriculture, and a productive agriculture is possible only when the people in it are appropriately trained in the technology.

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Commentary

*Sara Shelton
State Representative
South Carolina*

It is indeed a pleasure for me to be here and to listen to all the excellent speakers and commentators. I am sure that a lot of you have gotten as much from this as I have. Maybe to some of you this is old hat and you know it already; but I think the vigor of those who have presented has made an impression on us.

Dr. Hawley discussed teachers in the vocational education schools and he said they should be college-oriented but also be given vocational training. However, there is no appropriate process to merge vocational and academic education. Many of you know that there has been a recent study from the State Council on Vocational Technical Education in South Carolina. One of its reports indicated that a lot of teachers responded that they were not comfortable with mentioning vocational subjects while they were teaching and the vocational teachers were not comfortable with basic skills while they were teaching. And it brought out what has already been said -- that many of those teachers who come from business and industry were not very well versed in the "king's" language or in everyday language.

Dr. Hawley also suggested that teachers must have knowledge, expertise, and a variety of delivery systems, and I could not agree with him more. We know, and I think it is fairly well accepted, that we have different learning styles, different receptor systems, and that until that person who is teaching us strikes a spark with our receptor system, we don't do very much learning. If we want to take a lesson in humility, watch four or five youngsters among whom one has a bicycle, who has learned to ride and the others haven't. Perhaps their parents don't want them to ride bicycles, they probably think they will end up with a few broken legs and arms. But in a matter of two or three days all of them will be riding. They will be standing on the handle bars! Guess how this is accomplished? The one who knows how, who has the bicycle, doesn't tell the learners that they can't do it. If you will listen, their language is always positive and always encouraging. They say, "This is the way you do this, you do it that way, you avoid that," with such encouragement and tremendous support from a peer that in a few days they are flying back and forth. The same thing is true with other childhood sports and activities, so if we will take a little cue from that and avoid negative inference when we are teaching, our students will learn a lot more.

One current suggestion to improve education is to build partnerships with business and industry. We have done some of that in South Carolina, as I am sure most of you have. In many instances, businesses were so dissatisfied with the high school product that came to them, they decided that if they could work with the high school or establish internships, then students would be better prepared and business would be more eager to hire them. This has given us a new delivery system, and it has made a tremendous impact on the capabilities, the self-esteem, and the self-assurance of youngsters who enter the work force.

Mr. Lee talked about catfish and I can't help but commenting on that. I heard some men talking a couple of days ago and one was asking about a friend. He said, "Well, you know he had a catfish farm." "What happened?" "Well, he lost his shirt. He said he didn't have a market for them!" Before this person went into the catfish business, he should have evaluated the market for his catfish. The lesson is that students require a range of skills. Not only must students have thorough training in agribusiness, but also in marketing.

This was several years ago, and as Mr. Lee said, there is now a market for catfish and other fish that are being raised. Aquaculture, too, is going on in South Carolina. But we can't put the cart before the horse. Before we produce a product, those producers must be cautioned that

there is a business that must be taken care of, and that the product must have a market strong enough to bear the cost of production and profit. Vocational education must address all aspects of the business.

Commentary

Joe Nathan

*Coordinator of National Governors' Association
1991 Report on Education*

Governor Alexander from Tennessee, who is the chairman of the National Governors' Association, is fond of quoting Chet Atkins, who he calls the "resident philosopher" of Tennessee. One of his famous comments by Mr. Atkins is, "you better be careful about where you are going because you are liable to get there." It has been a humbling experience for me because I have learned a great deal, and it is clear that I have a great deal more to learn about your field. But I want to share a couple of concerns and ask frankly if any of you have these concerns.

I noted, before I stopped counting, the word "productivity" used 46 times. I heard the word "competition" used 57 times. I didn't hear the word "justice" used once -- not once. I have a concern about our learning and our teaching systems. That concern is that we need to continue a democratic tradition in which young people learn that they can have a positive impact on the world, that they can make and help make a better world.

We heard a lot about education for work today. We didn't hear much about education for citizenship. I think that citizenship is what we ought to be concerned about, folks. We ought to be concerned about a broader array of skills and a broader array of adult activities, one of which is work. Now let me ask a frank question. How many of you share that concern to some extent? Well, I want to very briefly tell you what I think some effective components of vocational education might be, using some examples from the South.

Many of you are familiar with the work of Jonathan Sher, who has worked with vocational educators throughout the South to help communities and young people and teachers identify the problems those communities have and then, as a part of the vocational education program, solve some of those problems. For example, he has worked with students in Brooks County, Georgia. Those young people identified the problem as a lack of a daycare center. They and their very skilled teachers set up daycare centers, and they learned how to provide daycare. They identified the problem, they learned, in cooperation with the teacher, the skills to do something about it, and then they established a needed program. It was so successful and was so much in demand, they established another business. There are many, many other examples.

We have talked a lot about technology. In Folsom, Pennsylvania -- not quite the South -- young people are learning to use computers to help do energy audits for the townspeople. In Ortonville, Minnesota, young people, as part of their vocational education course, use computers to help their parents who are farmers. Young people are learning that they can have a positive impact on some of the problems.

There are many other examples. Most of you in the room are familiar with Foxfire, in Rabun County, Georgia. I think that is a terrific vocational program. Young people are learning that they can serve community needs and they can learn about business. These are programs which help young people see that they can have an impact on the world. But, they can also be good citizens, they can earn a living while at the same time getting the basic and applied skills, the problem-solving skills that we have talked about.

What kinds of people help young people learn these skills? I would say they have four characteristics. First of all, there are vocational teachers who have had experience helping improve something. Colleges, or other vocational preparation programs, ought to give young people practice at improving something, whether it's in a community or their neighborhood. Young people need to learn by modeling. That is how we all learn to walk and talk -- we watch other people and imitate them.

Second, we need vocational education teachers who have a passion for justice and believe that they can improve the world, that the young people need to have such an opportunity as a part of their experience. Prospective vocational education teachers need to read books like, My Story, by Susan B. Anthony; Why We Can't Wait, by Martin Luther King; Rules For Radicals, by Saul Alinsky; and yes, How To Win Friends and Influence People, by Dale Carnegie. We need to be thinking of how we can learn to have an impact.

Dr. Hawley talked about the frustration that many people feel when they enter the teaching profession. I don't think we can keep pointing fingers back and forth between colleges and high schools. I think we need to help young people and older people learn that they can make a difference in those schools and such books will help them understand how they can go into schools and help make those schools better places.

Third, we need to help prospective vocational education teachers also learn how to encourage entrepreneurship. Sometimes when I talk about justice, business people come and say, well you are radical. This country was founded by radicals, and this country will be saved by entrepreneurs. In Minnesota, 3M often talks about how they try to nourish entrepreneurs and in fact, they would not be around if they had not had people who fought the system at 3M to produce scotch tape and other products. So we need to find ways to encourage entrepreneurs.

Finally, we need to encourage ways to help our prospective teachers work with families. There is some fascinating research that has recently come out that many teachers and many educators have a very different view of parent involvement than parents do. Parents want to be involved in supporting schools, but they also want to help schools make decisions. They don't want to take over for the educators, but they want to work with educators. It seems to me that we need them as part of our perspective. Our teacher education does not provide such skills.

Now these points are not intended to be exhaustive. I certainly am not an expert in vocational education, but these are just some of my impressions. I hope that these are some items that will be considered.

SUMMARY

Summary

Neal R. Peirce
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This has been a positively mind-expanding conference, especially the breadth of its view of our national situation, and the role of education therein, and then down to the very nitty-gritty specifics of vocational education.

Trying to put my mind around it has made me wonder whether I don't need to return to high school and college for the radically restructured education that some of your super-duper experts have described for you.

In college, we used to suspect many professors were not only trying to teach us to think, but to think their way. And as this non-education reporter has listened to your sessions, he finds the old technique working. It's a very skillful brainwashing. Your message is that education is the most vital investment we can make in our national future -- just as vital, if not more so, as Ray Marshall said, as essential physical infrastructure; and that the quality and productivity of our goods and services, the ingenuity to keep us afloat in the international economy, will all grow, or fail, based on our educational system.

Marc Tucker and David Mandel, who must have been comparing notes at the Carnegie Forum, both told us about instruction so mediocre that some kids are "bored out of their gourds" by the time they reach the last two years of high school. My reaction was to be scared out of my gourd by the international economic view that Marc Tucker told us about -- that we face serious decline in our national standard of living, and then potentially severe strain on our own social fabric, unless we improve education to be dramatically more competitive in the world.

I find Mr. Tucker's argument a tough one to rebut. The question it raises is: how do you get the broad American public, and especially skeptical taxpayers and voters, to see the point and agree to the sacrifices necessary to improve our education? Especially the challenge -- to hire top teachers, in a competitive job market. Teachers who can motivate, excite, truly educate.

Before touching specifically on vocational education, I would like to look at the broader questions for a few minutes. There is no question that some citizens are today catching the point that better schools are essential to our national future, and that those schools will cost more money. Otherwise the governors of the 50 states, and perhaps most spectacularly those here in the South, would not have made the exciting education reform advances they have in the 1980s. Nor would they be preparing, collectively, for a next-generation reform agenda, tough educational questions to be addressed and answered by 1991 under the project Joe Nathan heads.

But for the states of America in general, and here in the South in particular, the immediate prospect is not bright. In the Reagan-Gramm-Rudman-Hollings era, as Governor Bill Clinton reminded us, federal aid to states and localities is declining very rapidly. No one believes that even a liberal Democratic president could change that appreciably, because of the humongous demands from defense, entitlement programs, and interest payments on our ballooned national debt.

The new dilemma of the South is and will be how to raise taxes -- first to make up for federal cuts; second to make up for declines in our own economic base, such as declining taxes on reduced farm property values; and finally to pay for more adequate public services, even in the face of economic reversals.

Dallas economist Bernard Weinstein and two colleagues write in a new book that there has been a surprise economic turnaround in this decade. "Many parts of the Frostbelt," they write, "are returning to prosperity, while the Sunbelt has collapsed into only a few 'sunspots.'"

Most Southern states now have unemployment rates above the national average. By contrast, the six New England states that were on the economic ropes back in the '70s now have

the nation's lowest unemployment rates, most between three and four percent.

How have they done it? In large part because of their historic commitment to public expenditure for human capital development, with high-quality schools and colleges.

Weinstein notes that the layoffs, plant closings, and capital flight that afflicted the Northeast in the '70s have now gone South. He notes job losses in ten Sunbelt states triggered by decline in such industries as oil refining, petrochemicals, steel and textiles. At the same time, he adds, seven northern states have posted job gains.

What does all this say? I put it this way: that the swirling tides of national and international economic change are beyond any state's power to control. But the way a state manages its economy, from human services to capital spending, determines how well it can respond and adapt.

The situation is a mystery to no one at this conference. Many Southern states depended for decade upon decade on "smokestack" chasing for Northern firms, cheap land, low personal taxes, and no unions. Neglected in the process, until some of the celebrated Southern state "reforms" of the '80s, was serious investment in schools. Southern social "safety net" programs are still among the nation's stingiest.

Yet as Hillary Clinton reminded us, and others too, the real answers don't lie just in high school, or even in elementary school, but in much more adequate early childhood care -- investments which voters and politicians in the South, more than any other region, have historically and stoutly resisted.

Yet now it turns out that a balanced tax system and critical education and social expenditures -- all traditionally anathema to so many Southern legislatures -- are not the fruit of pointy-headed Yankee liberal thinking but rather the basics of running a resourceful and resilient society.

But then comes the cruel quandary. The South has a smaller tax base than Northern and Western states, yet has larger disadvantaged populations. And worse still, it has a political culture almost sure to resist making up for lost revenues by raising state taxes. That may throw a dark cloud over the region's celebrated education reforms of the '80s. And it could bar crucial public investments precisely when they're most needed.

An observer from the outside, like myself, has to wonder whether this region might repeal the Second Reconstruction that has brought it such stunning economic growth; whether the South could slip back into the disastrously negative politics that dominated so much of its Civil War century, when Bourbon Democrats and fiery Populists alike repressed education and human capital development. That scenario is surely not one I am predicting. Yet today it does loom, for the first time in years, into the range of the possible.

At a minimum, you in the South have an incredibly difficult political task ahead of you. The need, for example, to tap for very significant new taxes the one dynamically growing sector of your region's economy -- the services that happen to be centered in your centers of wealth, your cities.

Concurrently, there is the need to accomplish a great deal more with the resources you are already plowing into education. Many speakers in these sessions have said that is possible. But none said the transition would be easy.

Into that context come the spirited arguments about vocational education itself. And I might say here that I was surprised, as a reporter, not to hear a word about the great political clout that vocational education is supposed to wield in legislatures and local communities. Legend has it that vocational education is as powerful, in its way, as the National Rifle Association or the new national heavyweight, the National Association of Retired Persons. But since politics was never raised here, perhaps all my information has been wrong. So that one can concentrate, truly, on the merits, not the clout of the players.

Among the questions I did hear is whether vocational education is outdated, a necessary victim of a strenuous national effort to reform our entire educational system? Should it be scrapped altogether -- at least at the high school level? Is it a form of condescension toward minorities, a

way, as Carol Gibson mentioned earlier, to shovel them onto tracks with dim future job growth possibilities? Or is vocational education absolutely vital to economic prospects of poorer people and minorities?

I gather that those arguments did not originate with the papers prepared for this conference. I can tell you how they struck me: that unless high-school-based vocational education can sell itself a lot more forcefully than it has in the past, it ought to find itself on very shaky ground today. This is because of the point stressed again and again in the papers: that unless basic reading, writing and computational skills are learned first, and learned well, then vocational education can be a cruel hoax. A hoax on the kids, and bad news indeed as we try to build a competitive work force and to prove we're using the public's money well in the austerity era of Reagan, Gramm-Rudman, and all their friends.

It is so easy to lose sight of goals. Our friends from Carnegie said it very well this morning. David Mandel noted that "high wage employment opportunities will go to people who are adaptable, who can adjust to change, learn about new technologies, production processes and market opportunities, and advise management on ways to improve productivity."

Marc Tucker said:

It is not only possible, but necessary that sixth graders go on to the next level of schooling having learned to write a compelling essay, that junior and middle school graduates go on to high school having mastered statistics and probability, and that high school graduates be able to demonstrate a firm conceptual grasp of the principles of modern science. Even more important will be the ability to apply what has been learned to problems the student has never seen before, to work together with others on projects requiring joint effort, to understand not just what is so but why it is so, and demonstrate a capacity for creativeness in all one does. It is these capacities and others like them that must characterize future American workers if our elderly are not to live in poverty, our children are to grow up healthy, and our families are to prosper in the decades ahead. These goals greatly outdistance what has ever been achieved by most American schools. They imply a wholly new standard of performance.

That, it seems to me, is the kind of challenge that can excite the broad American public -- a public which, when well-informed, will make the choices for local and state and national economic survival.

Can teaching be radically upgraded? From what your presenters said, the potential is clearly there. Ray Marshall referred frequently to teaching techniques based on touch points of what young people already know. There was success with Job Corps enrollees, even those with very low IQ rates, while teaching them, for example, to learn writing by describing a technical task they're engaged in. I have heard another idea mentioned here: to make strong improvements in the generic technical education which our schools offer, with dramatically reduced attention to training youngsters for specific Standard Industrial Codes -- especially when they'll likely have to be retrained three or four times in their working lives anyway. That seems to be the wisdom of Jay Robinson, who talked about "getting kids well-prepared for specialized training afterwards -- putting our eggs in that basket." He also said, "It's simply not true kids can't learn at high conceptual levels. If we insist, and put remediation behind children, it's amazing what they can achieve."

Dr. Marshall also referred, incidentally, to the studies by Comer of Yale, showing how a change of attitudes and challenges to teachers took one of the lowest-rated New Haven schools and increased its performance dramatically, especially by changing attitudes of teachers and parents and students themselves, including introducing a participatory process in schools. A lot of the answer seems to lie, he said, in changing teachers' negative attitudes about kids -- the self-fulfilling prophecies that their so-called problem kids just can't learn.

You don't need, in fact, to be an education expert to have read numerous accounts, in schools of every variety from wealthy suburbs to the most troubled ghettos, of how a reorientation, new teacher motivation, or bringing students into the planning processes, have effected dramatic change. Likewise the community-based service for high school kids that Joe Nathan referred to. As a citizen, I find it hard to believe we couldn't be far more productive in our schools, with present personnel.

Half the answer, in other words, can come without gigantic new budgets, even if teacher upgrading will also require more and more professional wage scales.

The most compelling argument I heard from these sessions was that vocational education should be eased out of high schools, where it does have such a mottled record, and into the adult world of the community college and other post-secondary training institutes. The counterargument was also made. Ray Marshall said that the dichotomy between technical and non-technical education was a false one, and Harry LeColst argued that many young people in a rural area like the one of his LTV plant need vocational training in school. Barry Ballard also stressed that a large proportion of high school graduates never have another day of formal education. So if we abandon vocational education at high school, we may well commit kids to underemployment and unemployment many times.

Yet this outsider found the other argument more compelling. One reason is that there seems to be no proof that vocational education, in general, keeps more kids in high school, or prevents more dropouts, than standard courses in education. Multiple special arrangements can be made with local employers to give young people, while in school, experience in the world of work. The very exciting Minnesota experiment, that Joe Nathan told us about, allows 11th and 12th grade students to enroll full-time or part-time in the state's four-year or community colleges, simultaneously earning credit toward high school and college degrees. We can build competencies so kids will be ready for their truly vital vocational education, in corporations' training courses for new employees. We can be more technical in elements of the high school curriculum, because every citizen will need technical literacy, but not because we pretend we're training Joe or Mary Student for a specific job on graduation.

The focus on a broad education, not only the basics but developing the cognitive processing skills for our entire population, seems to me the exciting frontier. Is there danger of elitism? Of course. But is there also an opportunity to create one of the best-educated populations in world history, constantly advancing in competence, able to survive in ever-tougher world conditions? One would hope so.

Beyond that, we need to build a population that's civically competent, a population able to grasp the need for broad educational and social improvement. One that knows Mexico is a great nation and a time bomb waiting to explode on our southern frontier, that understands American democratic traditions, and how our political system works, and how individuals can effect change. We need young citizens who will be able to grasp the situation of their cities and counties and states and country, to be effective voters and civic persons. I fear that will rarely happen to young people put on a vocational education track, one we know from experience can be pretty narrow, in high school.

I heard it suggested today that we can't, as a society, afford to educate everyone through high school with the same background necessary for a future brain surgeon or bank president or educator. My instinctive reply to that is, how can we afford not to? If we desperately need all our population, including our minorities, to have vastly expanded learning and therefore earning frontiers, how can we afford to shunt them off onto anything like an early vocational track? Or use school time for vocational education courses that aren't themselves generic learning that everyone could benefit from?

Let me underscore that I am not and don't pretend to be an expert in this field. As far as vocational education goes, these are largely my impressions of a day only. What I do discern are the exciting possibilities to concentrate vocational education, closely geared into economic development planning and continued adult education, at the post-secondary level.

But in school -- as for that, one reporter has listened for a few hours, and has to report the case for elimination, or at the least, drastic reevaluation and cutback, seems stronger than the one for continuation.

Yet the dominant thought I will carry from this conference is the expansive and exciting frontiers of improved education, here in the South but also across our country, to make this a society of which we can all be much prouder -- a society that will provide exceedingly bright futures for all its citizens and not just the fortunate, academically tracked portion of our population.

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